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FLIGHT



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FLIGHT

A characteristic turning swoop of Audemars on his "Demoiselle," alias the "Angry Wasp," during the Bournemouth Aviation Week.

AERIAL LEGISLATION.

THE announcement that the German Government contemplates the appointment of a Minister of Aviation—coming as it does so soon after the International Conference on Aerial Navigation that met in Paris in May—is eloquent of the fact that before very long the law of the air will have to be considered very seriously by the world's jurists with a view to its proper codification. At present there is really nothing that can be called an international aerial law—let alone a national statute. The almost dramatic suddenness with which the aeroplane and the practical dirigible have, so to say, arrived, has found the world face to face with a set of conditions which have really never been considered as within the range of practical politics, and the governments of the world are in the position of being called upon to legislate for an entirely new and unlooked for factor literally without a precedent to guide them. It is true that the law of the air has received some small amount of attention, mostly of a purely academical nature, but it is also true that no single nation has ever thought it necessary to place laws upon its statute book, governing the hitherto problematical contingency of navigation of the air. The coming of practical aerial navigation has to a great extent threatened the annihilation of frontier barriers. As has been demonstrated time and again within the past year or two, the aeroplane and the dirigible balloon have removed the barriers, natural or artificial, between countries and States, and have set up a new problem to be dealt with—that of enforcing law in a medium that has hitherto known no human law. Of course, when we say that aerial navigation has rendered ineffective the frontiers and limits of States, we do not want to be taken too literally. The aeronaut who crossed into Germany, for instance, and landed on German soil without observing the formalities that generally accompany entrance to that favoured country, would probably find himself subjected to considerable personal inconvenience, and doubtless the police could deal with him under some section of the penal law. But that would not alter the fact that he had crossed the frontier without let or hindrance, or that at present there is no law of the air to define where he may or may not fly.

In connection with this problem of aerial law and its codification, there has come into being a body calling itself the Comité Juridique International de l'Aviation, which apparently hopes to set the aerial house in order. It does not appear that this body has as yet any official recognition, or that it has any powers to do other than discuss the question from general and specific standpoints. Its avowed objects are to (1) elaborate in each country the doctrine concerning legislation of the air; (2) to create a code relating to the air, and for this purpose to collect and codify all legal documents in reference to the subject in order to pave the way for, and discuss legislation; and (3) to defend in the different countries the interests of aviation. There are clearly two points of view from which this question of the law of the air must be studied—those of the State and those of the individual. Both are to receive attention at the hands of this unofficial body, which is, we judge, to consist of lawyers unfeathered by the lay element, though whether this is because that element might give trouble by desiring to make the code too easily comprehended by the "man in the street" is not, so far as we are aware, stated.

Concerning the international aspect of aviation, that may safely be left to the governments themselves to

negotiate upon when the time comes, as come it must within a very short while. The question is one of relative simplicity and should give rise to no more difficulty than the definition of the law relating to the entrance of vessels which travel in or upon another element than the air. But when it comes to a consideration of what we have called the "individual" law of the air, that is quite another matter, and numberless questions and complications arise. Is there at present anything at all which can be construed as a law of the air in this country? We read from time to time in the daily papers of "Trespassing by Aeroplane," but nobody seems to have any very lucid idea of what constitutes trespassing by aeroplane. Of course, if an aviator lands on private property he can be proceeded against under the common law for trespass, and the amount of any damage done to that property recovered from him; but that is not what is meant by most correspondents who write alarmist letters to their pet journals. What they usually want to know is whether they can gibbet an aviator who dares to fly over a ten acre field which does not belong to him, and if not, why not.

We are told by some authorities that the property of a land-owner in his land extends from the centre of the earth to the heavens. That, to our mind, is a farcical dictum and can best be disposed of by an almost equally farcical reply. Supposing that doctrine to be correct, by the time the centre of the earth is reached we have arrived at the point from which the radius is taken and the property which looked so imposing on the surface has dwindled progressively to a mere point. That being so, to what extent has the land-owner's property in the air—or the ether—accrued by the time he has reached his limit—the heavens?

To say that the private citizen has a property in the air above his holding seems to us about as logical as for the owner of land on the west coast of Ireland, for example, claiming that the sea half-way across to America belonged to him; and that he would not have ships sailing on his bit of ocean. Sea and air are and must always be common property, and the latter must be as free for navigation as the former. The difference is that in the one case law and custom has grown up during the course of centuries until there is not the slightest ambiguity as to the rights of nations and individuals in its use; while in the other it has only just become possible to navigate in a medium that has defied the efforts of man for many centuries. It is not even as though there had been a reasonable probability of aerial navigation becoming an accomplished fact at any time during the last hundred years, so that our jurisconsults could have codified the laws in anticipation of requirements to come. Even five years ago the inventor who went to the Patent Office with an invention relating to aerial flight was looked upon as a crank and pitied accordingly. So what wonder that the sudden achievement of success has found the legal world unprepared to cope with it. Official or unofficial as the case may be, any really useful work should be welcomed that will help us to an understanding of the laws which at present bear either directly or indirectly upon the situation. Also the results of rational deliberations as to directions in which legislation may ultimately be found desirable would be interesting, even though it is impossible not to feel very chary indeed about fresh restrictions of any kind whatever as applied to any new and growing industry.

FLIGHT PIONEERS.



MR. J. ARMSTRONG DREXEL.

FROM BOURNEMOUTH TO THE NEW FOREST BY AEROPLANE.

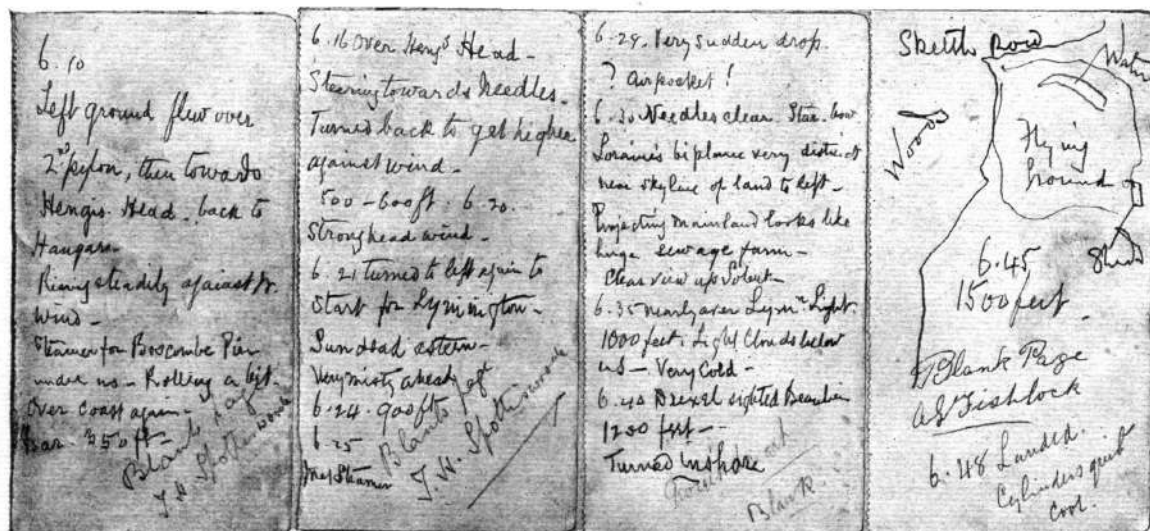
THAT within about two years from the first public flight in the world, men should be flying home after fulfilling an engagement at an aviation meeting, instead of elaborately packing up their machines and carting by road or despatching by train, is the most eloquent demonstration it is possible to adduce of the phenomenal progress achieved in the conquest of the air in so short a period. That such a feat should also pass almost unnoticed in the Press is a still further proof of the advances made, rendering such a journey as accepted quite in the ordinary course of daily events. Yet such is the position to-day, whilst it is but three or four months back that there was a big wave of lamentations and sneers that Great Britain was all behind again, and had not a real flyer to her name! After the Bournemouth aviation week had been closed, all haste was made by most of the men who had taken part to forward their machines to the next point of demonstration. Mr. Armstrong Drexel and Mr. W. E. McArdle, who have founded such a fine school of flying at Beaulieu, in Hampshire, however, determined to return home by way of the air, in like manner to the arrival at the Southbourne aerodrome by McArdle a week previously. Then only one Blériot was available. For the return the two-seated Blériot of Morane had also been added to their fleet by the firm, so that Drexel was this time able to take a mount as well as his partner. And so it came about that, without fuss or blowing of trumpets, they both set out on Tuesday evening of last week and accomplished what three years ago would have secured for them pages of laudatory notice in practically every newspaper in the world. It is still a feat to be supremely proud of, more particularly from the fact that Drexel took with him Mr. Harry Delacombe, the well-known newspaper correspondent, who is so keenly interested in bringing home to the naval and military authorities the practical and national purposes to which the aeroplane can be put. He has clearly demonstrated the ease with which notes and sketches can be made in writing by a passenger that would in the hands of a General prove of immeasurable value. To this end we reproduce his original notes made during the flight with Drexel. Each of these slips of an ordinary note-book were signed in advance by Mr. Spottiswood and others as blank pages, and from these the announcement of the journey was made in the *Morning Post* the next morning. Supplementing on the following day the bare facts of the flight, the following details of his experience appeared on Thursday, which are of such historical interest that we reproduce them in full, as well as a special account from the pen of Mr. McArdle of his little trip, in which he was so encircled in clouds and mist that he lost his way, and descended at last at Fordingbridge by reason of petrol shortage. It is thus that Mr. Delacombe describes his trip:—

"When we reached the aerodrome at 4.30 there was a nasty gusty wind blowing, and Mr. McArdle (Mr. Drexel's partner in

the Beaulieu Aviation School), considering the conditions quite unsuitable for our attempt to fly over the sea and forest to Beaulieu, suggested postponing the start, hoping the wind might drop. Mr. Drexel thought, on the contrary, that it might become more blustery, and was most anxious to be off. It had been arranged that he and I in the double-seated Blériot monoplane should start first, followed after a few minutes by Mr. McArdle on the single-seater, as the latter, with only one person to carry, was sure to travel the faster, and probably overtake us *en route*. There was also the possibility that either machine might drop into the sea (where there was no cordon of motor boats and steam yachts as arranged for the over-sea flights to the Needles last week), be perceived by the other, and perhaps be reached sooner from the definite information it could carry to land. As no change in the weather appeared likely at 6 p.m., we decided to set out. Mr. Drexel thought our safety lay in rising about 1,000 ft. before making the journey, and said it would probably be necessary to encircle the aerodrome two or three times to attain this altitude. A single circuit only enabled us to climb to 350 ft. So round we went again, rising rapidly as we faced the wind, but having great difficulty in keeping our height with the wind astern, the "lift" being enormously decreased and the position of our machine becoming somewhat like that of a kangaroo sitting on its tail. Mr. Drexel's idea in flying high was: first, the hope of escaping gusts and finding a steadier wind than prevailed below; and, secondly, if the motor should perchance stop, the better chance of gliding down either into one of the few small open spaces among the almost endless trees, or else turning about and planing down for the sea, where we had a far better chance than if descending involuntarily among trees, houses, or marshy land.

A Bird's-Eye View.

"Satisfied at last as to our height, he steered direct from Hengistbury Head towards the Needles, which seemed almost below us, though really some two miles distant. We could see Mr. Loraine's aeroplane with people surrounding it very distinctly on the high land over Alum Bay, and as we turned to the left over the promontory of Hurst Castle the view up the Solent as far as Southampton on the left and Cowes on the right was clearly mapped out underneath. All this time the wind had been dead astern, and Mr. Drexel had a hard tussle to preserve our altitude to his liking. Once, when he asked me if I could see anything of 'Mac' following, I turned round, distinguished the aerodrome, but saw no machine aloft. I did, however, see that our tail, instead of being horizontal, was horribly out of the level, and momentary thoughts of head resistance and a backward fall flashed through my mind. The placid smile and cool behaviour of my com-



Photographs of the original leaves from Mr. Delacombe's note-book.

panion would, however, have reassured the most timid, and I was happy in the sensation of unlimited power conveyed by the regular throbbing of the motor and the mighty beats of our propeller-blades as we soared steadily ahead. Suddenly I heard 'Look! there's old Beaulieu!' Following the direction in which he was gazing, I could distinguish nothing but apparently black forest. A winding road and a peculiar shaped patch of water, however, I guessed were his landing marks, and it was with a feeling rather of regret that I saw we were turning sharply to the left, and leaving the friendly sea behind, to fly over country which, from a height of 1,500 ft., looked everywhere literally unapproachable for our frail craft. With a nudge and a grin Drexel put forward the *cloche*, and we headed downwards till he was almost standing on his foot tiller, and my feet were pressed against the front part of our little cock-pit. Then at last I realised how much we had been leaning backwards during the flight, for we were rushing through the air at about 80 miles an hour at a bigger angle probably than we had previously assumed in the other direction.

"At once I could make out the road and hangars of the Aviation School to our right, and could see a small crowd of black dots running out on what I had just before mistaken for another patch of murky forest. In three minutes we had glided more than 1,500 ft. downwards, and then came the end of my novel experience, for we landed, and were surrounded by friends, to one of whom I gave the notes I had scribbled on leaves of my pocket-book, signed as blank pages by other friends just before we left the ground at Southbourne.

Possibilities of Aeroplane Reconnoitring.

"Throughout the run I was entrusted with a rubber ball, by squeezing which a constant pressure is maintained in the feed, and I also constantly leant forward and peeped over our bows to keep Drexel informed of our whereabouts. These minor duties, however, did not prevent me from carrying out my cherished hope of proving the practicability of writing legibly during a flight, and my scribbled log of the trip is sufficiently legible to prove beyond any question that trained officers or men could easily do surveying work of the utmost importance and utility at far greater heights than we reached, for with binoculars and a clearer atmosphere I could have distinguished every necessary detail, and transmitted my impressions to paper with explanatory notes in perfect comfort by stooping below the backwash of our propeller and the ordinary rush of air as we raced along. We saw Mr. McArdle flying about 800 ft. over the Beaulieu Aviation School five minutes after our descent, but he passed out of sight in the direction of Lyndhurst. As he did not reappear after an hour's interval, and we knew his petrol supply at the start could only suffice for a flight of one hour and a half, we started off in motor cars to try and glean some news, fearing he might have been obliged to descend in the New Forest, a most risky undertaking. Although we made circles of gradually increasing radii, knocked up every house or cottage showing a light, and questioned everyone we met, we got no definite news until reaching Fordingbridge (from Downton, near Salisbury) at 3 a.m., when, with a sigh of relief, we learnt that he

had landed safely in a cornfield at Stuckton, a mile away, at about 7.30 p.m., and that his machine, not much damaged, had been housed for the night in a neighbouring iron-foundry. Fagged out, hungry, and sleepy, Mr. Cecil Grace, who had been driving us ceaselessly since 8.30 p.m., turned his car for Beaulieu, 24 miles distant, and we all enjoyed a good sleep at last, after a somewhat arduous day and very anxious night. Mr. Drexel expressed his opinion yesterday that it would probably be hard to find a more unfavourable part of England for a cross-country flight than that from Southbourne to Beaulieu, especially burdened with a passenger. 'Where ignorance is bliss!' I need not further explain my enjoyment of the trip."



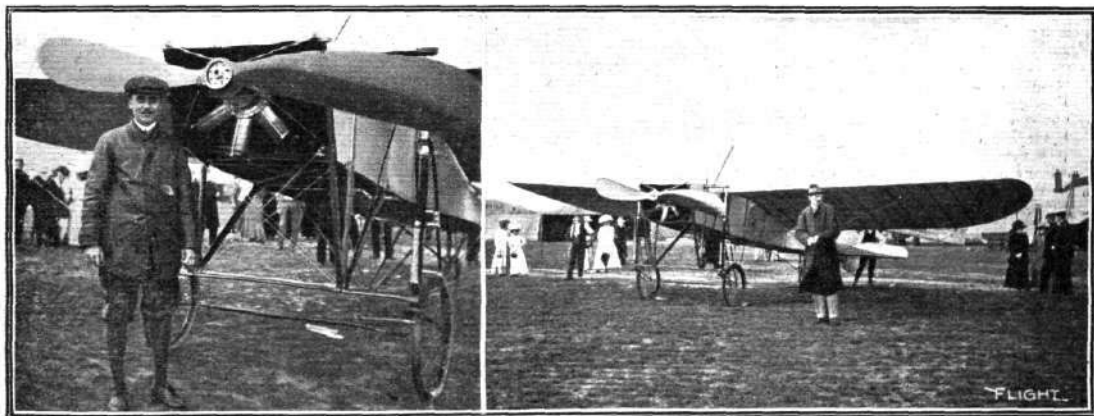
Photo by Mr. T. H. Spottiswood.

Mr. Armstrong Drexel and his passenger, Mr. Delacombe (who travelled without hat or coat), just before leaving *terra firma* for the homeward journey from Bournemouth to Beaulieu flying school.

NOTES BY MR. DREXEL.

Mr. Drexel is a man of few words. He believes in action more. We managed nevertheless to obtain a few points from him of his impressions and his methods in connection with a trip of this character. The following are a few of his helpful hints:—

"The first most important discovery I made was that in crossing over water one appears to be much lower than really is the case. It is extraordinary the difference one estimates one has risen to and the exact height registered by the 'altitude finder.' The downward currents which are often encountered over the sea I fortunately only experienced once, and found it necessary in order to increase my altitude to at once turn into the teeth of the wind. My general impressions of the velocity of the wind was that it maintained, as



Photos by Mr. T. H. Spottiswood.

HOME BY AEROPLANE.—Mr. J. Armstrong Drexel and his 2-seated Blériot just before his start last week for home at Beaulieu after the Bournemouth Aviation Week. On the right Mr. Delacombe, his companion on this cross-sea flight, is standing waiting to take his seat on the machine.

near as I could judge, about 15 miles an hour. And the wind going in the same direction as I was, I had great difficulty in getting to what I consider a safe height, about 800 ft. in flying over water or across country, and, in order to arrive at that height, had twice to turn back near the Aerodrome and face the wind. Over Lympington I had some difficulty in finding Beaulieu owing to some clouds beneath us, but as soon as we had passed them by I immediately recognised our destination by a long white road and a lake near by. All the way over the sea for a good 15 miles I found it very difficult indeed to rise, but as soon as we were over Lympington we got a wind from the opposite direction, and rose without any trouble to 1,500 ft. As soon as we got to 1,000 ft. I felt much easier in my mind, as, personally, I never like to fly across country in England under 800 ft. At that height it seems to me one always has a fair chance if one's engine stops or starts miss-firing, if looking about and planing down on to clear ground, but anything under, unless the country is singularly free from trees and houses. I consider most dangerous, and does not give one a fair chance. There is no doubt in my mind at all that aeroplanes will become the accepted agents for the purpose of scouting in warfare. I was particularly struck with the view we got of the Solent and the land on each side, and although it was a very misty day, we could see a very long way. But coming back to the point before mentioned, my own thought after the flight was that the higher you are the safer it is in cross-country flying."

MR. McARDLE'S EXPERIENCES.

Mr. McArdle's account of his extraordinary experiences during his homeward flight from Bournemouth is as follows:—

"Tuesday, July 19th, three days after the close of the first International aviation week held at Bournemouth, I decided to fly our Blériot monoplane—the same machine which I flew to Bournemouth the day previous to the opening of the meeting—back to Beaulieu to the school ground. The distance as the crow flies is about 20 miles, but to avoid rather bad forest ground we prefer the sea route, which is about 6 or 8 miles longer. Glancing at the watch strapped in front of me, I noticed it was 6.15 p.m., and setting my motor (Gnome) to run 1,200 revs. per minute, I rose steadily from the aerodrome. Drexel had left just 8 minutes before, accompanied by Harry Delacombe. Before leaving the ground I could easily see them in the distance making for the same place as I intended. I at once went up to 500 feet. Unlike our big machine I had no occasion to circle the aerodrome, as I reached this altitude before passing Hengistbury Head, although the machine did not rise as quick as usual owing to a following wind of about 15 miles an hour. Banks of mist at once loomed ominously ahead, and looking towards the land I noticed the mist was much worse than over the sea. I determined therefore to head direct for Hurst Lighthouse. Flying over the sea the whole way, and rising up to 1,000 ft. on my way, I passed through several banks of mist. I thought it rather strange that these banks of mist should linger idly about, especially considering that it had been blowing fairly hard all day, but the air has a lot of secrets yet to be discovered.

"By way of this, my flight a few days before on the Saturday came back to my recollection, when, flying over part of the town and bay, I found when I turned my machine around in the direction of the aerodrome I appeared to be practically stationary, so strong was the wind against me. Below, more than 1,000 ft., I could see Bournemouth Pier. I gazed at it in almost the same manner as one would from a stationary tower. Easing my motor to come to a lower level, I was almost spun round. Instantly I increased my power sufficient to keep my head to wind until I fell to about 500 ft., when I discovered I was again going ahead, there being less wind at this height, and when I reached the aerodrome fifteen minutes later the flags hung absolutely still! Therefore meditate ye scientists who wish to help to the complete conquest of the air, upon the problem of aviators having to meet violent winds 1,000 ft. up on what below is considered to be a *calm* day. The secret of success would appear to be plenty of reserve power, considering that on this day in question the 50-h.p. Gnome could not make any appreciable headway with a tiny object like the Type XI Blériot at an altitude of 1,000 ft.

"To resume my homeward journey, when opposite the Isle of Wight I endeavoured to catch a glimpse of friend 'Jones' or his biplane, but failed. Passing over Hurst Castle I saw it was 6.25. By that it is evident I was travelling more than a mile a minute, the wind being directly behind. At the moment though I did not think much about pace, except that I appeared to be travelling rather slowly than the reverse. Looking below at Hurst I thought how easy it would be to take a 'snap' of the place, and for a foreigner to disclose some of our naval secrets, should any be visible from above.

"Leaving Hurst behind about three miles, I turned over the mainland direct for our Beaulieu school-ground, on which I calculated I ought to have landed in a few minutes. To the right I saw Southampton, and such a thing as losing my way never occurred to me for a moment, as the whole of the forest and the surrounding country is so entirely familiar to me from having motored over it for the past ten years. Again glancing at my clock I saw it was sixteen minutes to seven. I at once realised that I must have passed my destination. It seemed incredible that I could do this, as the flying grounds are nearly 5,000 acres, I believe, in extent. What height could I be up to have done this? Referring to my recorder I found it registered 1,200 feet, from which height I should have seen it easily. However, facts are facts, so I decided to drop down a little and circle round to pick up a bearing. The third circle brought me into a white cloud or mist which enveloped me for a minute or so, thus completing my mystification. After this nothing appeared familiar that might have helped me out of my quandary, although even then I felt I would find my way. So I dropped low enough to follow a road, which I felt sure would give me a clue. But in this I was disappointed. Road after road I picked out and followed with the same result. Small villages that I must have motored through dozens of times were all alike, unrecognisable. Not until 7.30 did I give up hope of getting to Beaulieu. As a last resource, why not try to find the sea, I thought? I had found it very easy to distinguish water from land at almost any height within sight. So I determined I would mount up, spy out the sea, and return to Bournemouth. After steadily rising to over 2,000 ft. or so, I had, however, to give up this idea, as glancing at my petrol and oil, I found it was nearly all gone. Then and not before did I really realise the distance I must have travelled to have used 10 gals. of petrol and 4½ gals. of oil. I quickly made up my mind to find a landing spot. Descending at once to a low level I found I was over the heart of the forest, whereas before my final effort to discover the sea I had noticed plenty of possible decent landing places, had I wished to regain *terra firma*. Now, flying straight on, in as direct a line as possible, in a very few minutes I was over fields and a small town. The fields, although very small, at least offered fairly safe landing, and selecting what appeared to be the largest, I was forced to switch off my motor and do a *vol plane*. Levelling my machine up just before reaching the earth, I let her fall flat, the tail slightly low. Unfortunately my propeller had stopped in an upright position and stuck in the earth, causing the machine to heel up. Alighting from the front instead of the usual back way, I caught hold of the tail and pulled her down straight, when I found the two front cross-pieces, top and bottom, were damaged. The propeller had a split from the boss down to about a foot from the end. Previous to landing I saw a lot of people, who now rushed up. One of the locals demanded 'Who be 'e?' To which I replied, 'I hardly know myself. Where am I?' 'Thee be about a mile from Fordingbridge,' came the prompt reply. And it was then about ten minutes to eight, one hour and thirty-five minutes since I left Bournemouth. I must, therefore, have travelled, circles and straight, something over 70 miles. Dismantling my machine, I proceeded at best speed by motor, hired in the village, to Beaulieu to relieve the anxiety of my wife and friends who were following me by cars. I arrived at 10 p.m., but so difficult a course to follow had I flown that poor Drexel, Grace, Delacombe and Spottiswood hunted the Forest till five o'clock next morning before locating the place of my descent. Hearing at last that I was safe, they at once turned for Beaulieu and rest after nearly nine hours' search. They told me afterwards that I passed right over the ground and sheds—in fact, clean over the machine which Drexel and Delacombe came in. I was then about eight or ten hundred feet high. Believing I was making for Southampton they did not worry about me until it began to get dark. My wife, who was present, assured them I knew the Forest too well to lose myself; I must, therefore, have come down somewhere, owing to motor or other troubles. That I had lost my way never entered anybody's mind.

"Now the real cause of my losing my way was due to my motor not being sufficiently guarded to restrain the oil from flying in my face. Almost impossible as it may be to believe, this formed a film right over my eyes *without my being aware of the fact!* The consequence of this was that I thought I was in a dense mist until I bathed my face in hot water. After which the mist disappeared, as if by magic, thus accounting for my passing over the school ground and sheds without seeing them. Upon reflection my route must have been as follows:—Bournemouth direct to 3 or 4 miles beyond Hurst, up the Solent, across Beaulieu Heath and village, Hythe, Sopley, across the railway at Lyndhurst Road direct for Lyndhurst, circled over part of the Forest in the direction of Cadnam, back over the Lyndhurst Road Station, turned again near Totton direct for Salisbury, finally circling over Fordingbridge, and landing in an oatfield one mile out."

FLYERS AND YACHTS.

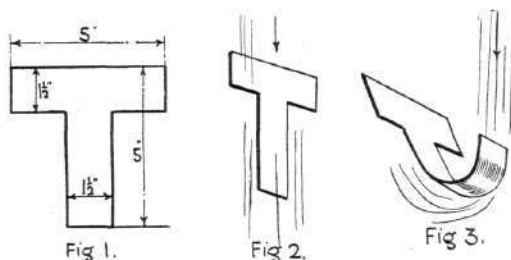
AN EXPLANATION OF THE ADVANTAGE OF THE BROADSIDE ON AEROPLANE, AND A COMPARISON BETWEEN THE DECK OF A FLYER AND THE SAIL OF A YACHT.

A LETTER from a correspondent, Mr. G. C. Sherrin, which will be found elsewhere, draws attention to a very interesting problem in aerodynamics, which is that of the sailing yacht making up to windward. Mr. Sherrin asks two questions. The first is, why an aeroplane should have a high aspect ratio (ratio of span to chord), that is to say, why it should proceed broadside on rather than end on; and secondly, why, if a high aspect ratio is proper in an aeroplane, should it not be correct for the sail of a yacht.

The first question can be answered experimentally as well as theoretically, and has already been dealt with in an article which appeared in FLIGHT, Vol. I, p. 295. But as it there only forms a part of the article in question, it may not be inappropriate to enlarge upon the subject again under the present circumstances.

The Tee Test.

First of all to take the experimental side of the case, as experiments are always apt to be more convincing than words. If our readers, and Mr. Sherrin in particular, will, before proceeding further with this article, take the trouble



to cut out of a sheet of notepaper a large letter T (Fig. 1), as large as is reasonable considering the size of the paper used. The depth of the head and the width of the stem may both be conveniently made, say an inch and a half, and the height should be equal to the width, each dimension being, say, 5 ins., if the notepaper used happens to be of the particular size of that on which our correspondent has written. Some little care should be taken not to crease the paper, and we have suggested notepaper because it is neither too limp nor too stiff; it so very often happens in experimental work that the experiment does not "come off" as it ought upon the important occasion.

Having cut out the T, hold it between the finger and thumb so that it hangs stem down above the floor; then let it drop (Fig. 2). If the paper has been cut as it should, the piece falls like a stone without swerving one way or the other. Now hold the T by the stem, and let it drop head down (Fig. 3) on to the floor. Quite a different result will be observed, for the T will reverse in its descent, so that it reaches the ground stem first as in the former case. In order to give the experiment a reasonable chance of success, it may be remarked that the paper should be dropped from a fair height, say 7 or 8 ft., in order that it may acquire sufficient velocity.

Broadside v. End on.

Now the T-shaped piece of paper is an aeroplane which simultaneously combines the two principles under

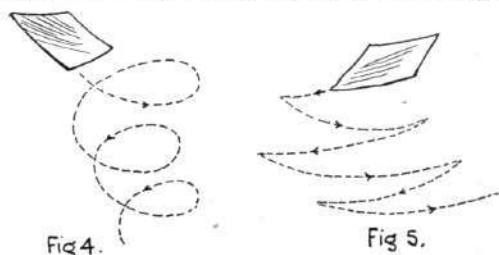
discussion. The stem considered by itself invariably proceeds through the air end-on, while the head-piece, on the other hand, invariably travels broadside on; and it will be observed that these aspects are the same whether the T is dropped head first or stem first. If the effect of the air reaction were uninfluenced by aspect, then it would obviously make no difference to the behaviour of the piece as a whole whether it were dropped head first or stem first. There would be no decisive features peculiar to one mode of progression as distinct from the other. In fact, if any difference were expected at all, it is rather the reverse of what actually takes place, for it might be supposed that if disturbed the piece would turn over and fall head first, the head being the heavier end.

Theory of the Tee Test.

It is therefore fairly obvious that aerodynamic considerations are alone responsible for the observed phenomena, and it thus remains to inquire what conditions can account for the reversing of the T when it is dropped head down, which will simultaneously account for the stable mode of motion when it is dropped tail first. It does not need a great deal of argument to show that if the head experiences a greater pressure reaction per unit of area than the stem, that this is sufficient to account for both cases. It may of course be asked, how is there any pressure reaction at all, seeing that the T in any case starts its course edgewise through the air. The answer to that question is merely this, that in an experiment of this kind the apparatus employed, which in this case is a flexible piece of paper, is quite sensitive to slight disturbances. Not being rigid, the paper is not well adapted to cleaving an uninterrupted passage through the air as a wooden Tee-square, for instance, could do with ease, and, consequently, it is practically certain that before it has gone very far on its downward path it will have swerved a little to one side or the other. There is very possibly a slight draught in the room where the experiment is tried, and in any case the air will not be absolutely still. It needs very little to make the piece of paper swerve, but once it has moved it becomes an inclined aeroplane, and all the phenomena associated with flight at once ensue. The pressure reaction acts perpendicularly to the surfaces, and the angle of incidence, which at first is almost minute, becomes greater as the velocity increases.

The Revolving Parachute.

If the piece of paper with which the experiment is carried out is a single rectangle instead of a T, the angle



of incidence will increase in just the same way, but with this important difference, that when the paper has

attained a horizontal position relatively to the ground, it will either suddenly start revolving (Fig. 4), or else slide backwards, in which latter case it will flutter to the ground along a zigzag (Fig. 5) path. Both cases are of great interest, although a little outside the present subject except by way of comparison. The T piece of paper, as we have seen, reverses if dropped head down, but except for this one manoeuvre it may otherwise be described as stable in its path of descent. It does not flutter or revolve, and the reason for this is that the pressure reaction on the head is always greater than on the stem, so that when the head has once got above the stem it is quite capable of resisting any tendency which the stem might have to reverse their relative positions once more. That this tendency exists may be proved by using very limp paper for the same experiment, when the stem will

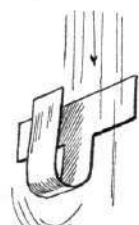


Fig. 6.

quite double up (Fig. 6) under the pressure, and may even thereby destroy the stability. In the rectangular piece of paper this exchange of relative positions may continue indefinitely, as when the paper falls rotating. But in the T piece there is only one stable position, and that position is attained automatically. There is, as we have already pointed out, no difference between the stem and the head of the T piece, except their respective aspects to the line of flight. The head travels broadside on and the stem end on, and it is thus clear that there is undoubtedly a greater intensity of pressure per unit area resulting from the broadside on aspect.

A Lesson from the Arrow.

There has been a practical application of this principle ever since mankind in the dark ages had that gleam of intuition which led him to fit a feather in the tail of his arrow. An arrow, when fitted with a feather (Fig. 7) is, in



Fig. 7.

principle, the T with which the foregoing experiments have been made. It is rather a singularly shaped T it is true, but the principle is there just the same.

The shaft of the arrow is the stem of the T, and the feather as a whole is the head. Considered by itself the feather is commonly in end on aspect, but its width relative to the width of the arrow shaft forms a broadside on aeroplane.

Any solid body moving through the air is subject to its reaction, and thus it is perfectly in order to look upon the shaft of an arrow as being an end on aeroplane in spite of its round section.

In speaking of these experiments, it must not be supposed that the use of the term "aeroplane" implies that the air reactions to which reference is being made are actually employed in load-carrying operations. The shaft of an arrow would be no use whatever as an aeroplane considered from the point of view of a load-carrying machine, but on the other hand the disturbing influence of its aeroplane reaction on its line of flight may be considerable. It is a little difficult, perhaps, to make this point quite clear, but it is very important to be properly understood, as not only does it throw a very considerable amount of light on many physical problems, but it explains why the cases referred to in particular, form such very suitable experiments. In them the aeroplane reaction has nothing to do but control direction, and the apparatus as a whole is thus extremely sensitive to differences in pressure, which might not be so well noticed in an actual load-carrying machine. The arrow travels straight to its mark for the same reason that the T piece of paper falls straight to the ground if dropped stem first, because the pressure reaction on the feathers is greater than that on the stem, and thus prevents the swerving which would otherwise quite likely take place from the least disturbance.

That the arrow possesses similar properties to the T piece of paper can be shown by launching an arrow feather first when it will up-end so as to come stem first to the ground.

(To be concluded.)

A SAFETY SEA JACKET FOR PILOTS.

THERE is no doubt that the peril of a sea flight is a real danger that no pilot, even though he be a good swimmer, is justified in ignoring. If a forced descent on the water becomes necessary, it is imperative that the pilot, at any rate, should be able to keep afloat until assistance can reach him. To don the ordinary cumbersome life-belts is a proceeding that is rather too suggestive of making a fuss to appeal to the average Englishman, whose practice flights may occasionally be made beyond the confines of the shore, and the advantage of being able to wear a reasonable garment that will dispense with the necessity of life-belts altogether should appeal to everyone who is likely to be brought into the danger of drowning. The Read Norfolk jacket is a garment possessed of this virtue. In appearance it is a well-made coat of good khaki-coloured material, and on the inside it is quilted, the substance of the lining being of a woolly nature and treated by a secret process. Neither the thick-

ness of the coat nor its weight is in any way such as would prevent the wearer from using it for ordinary work. The quilting does not occur in the sleeves, and consequently the arm movements are quite free. It is claimed for this jacket that anyone wearing it can float for days in the water without any danger of drowning. The coats can be obtained ready-made or can be made to measure, to the purchaser's own designs. Moreover, it is not necessary that this life-saving garment should be a coat; it may be, if preferred, a waistcoat, and many such are in use among yachtsmen. Being quilted, the Read jacket is warm and comfortable in cold weather, and is also, as a matter of fact, one of the best protections against a very hot sun, for just as it prevents the body losing its warmth in the cold air so does it prevent the excessive heat-rays penetrating to the skin. For the pilot-aviator it would certainly seem to be just the thing, not to say a necessary.

A Memorable Anniversary.

It hardly seems possible that only twelve months have elapsed since M. Louis Blériot flew across the Channel, and yet the exact date on which this epoch-making flight was made was July 25th, 1909. During the year which has passed since then the progress has been extraordinary, and not only has the flight been duplicated by M. Jacques de Lesseps, but surpassed by the glorious flight of the late Hon. C. S. Rolls when he flew from Dover to Calais and back; and to-day almost all the world's records stand to the credit of the Blériot monoplane.

Fabric for High Flyers.

AT Bournemouth, as at other meetings, the greater number of flying machines which took part in the competitions were fitted with Continental fabric.

Everyone who witnessed the splendid performance of M. Morane, when he climbed to a height of over 4,000 ft., can easily imagine the important part which the fabric plays, and to what extent the aviator's safety depends on the strength of the material with which the wings of his machine are fitted.

SOME FLIGHT ACCESSORIES—continued.

LUBRICANTS AND FUELS.

S. Bowley and Son.—Special fuels for aeroplanes known as "Bomo" and "Express," are supplied by the above firm, also all descriptions of lubricating oils and greases.

W. G. Nixey.—W. G. Nixey and Co. make a graphite grease for aero engines, also a graphite lubricant for chains.



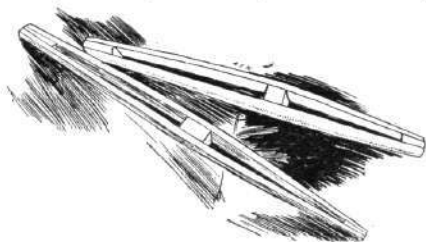
A group of "Asco" aluminium socket-brackets made by the Aeroplane Supply Co.



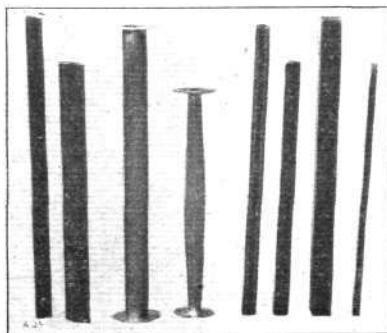
A group of aluminium socket-brackets and wire strainers made by Handley Page, Ltd.

RUB METAL.

Rub metal is a patented material having a rubber base amalgamated with a combination of metallic salts and gum and is claimed to be unaffected by acids or grease. It may be used for making con-

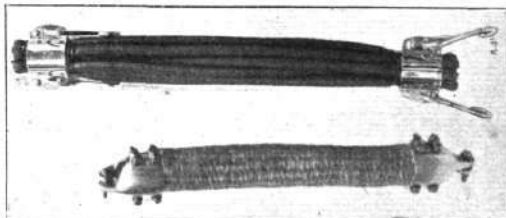


Samples of built-up struts made by the Aeroplane Supply Co. These struts are made of silver spruce.

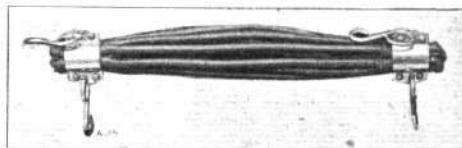


Examples of tubular steel work by Rubery, Owen and Co. The tubular steel struts shown in the centre are pressed in halves, and joined together by oxy-acetylene welding.

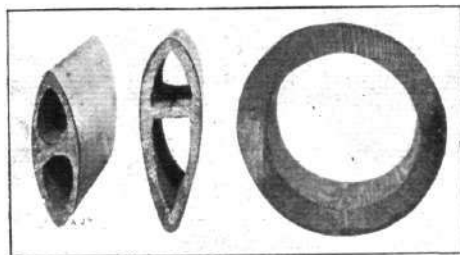
nections in petrol pipes or oil pipes without deteriorating. It is supplied by the New Motor and General Rubber Co., in the form of tyres.



Two elastic shock-absorbers by the Aeroplane Supply Co.



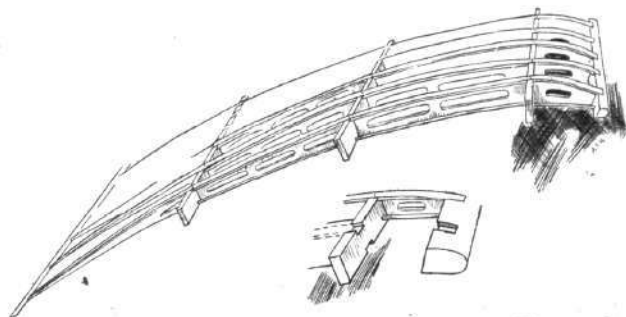
An elastic spring made by Handley Page, Ltd.



Three examples of hollow spars by T. W. K. Clarke and Co. The oval sections, it will be noticed, have a web down the centre. These spars are made in halves, and the wood is silver spruce.

SHEDS.

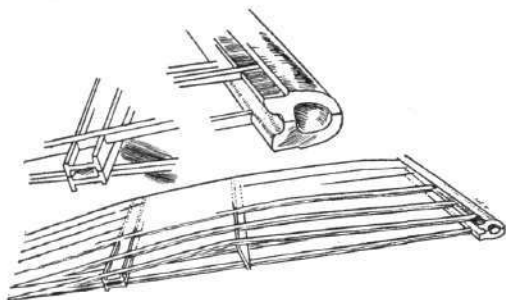
The Aerial Manufacturing Co. of Great Britain and Ireland undertake the construction of special sheds of their own design, which are made more or less portable, if required.



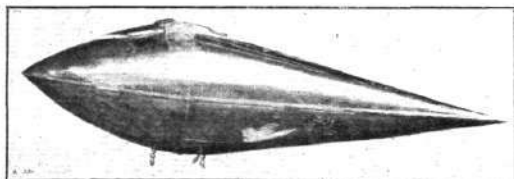
Example of wing construction by Holland and Holland. The ribs are built up, the flanges are continuous, but the webs are in separate lengths.

SOCKETS

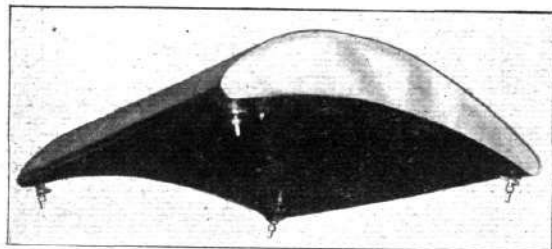
Aluminium lugs and sockets in a variety of shapes, polished or plain, are supplied by the Aeroplane Supply Co., Handley Page, Ltd., Gratz, Ltd., and Messrs. Harris and Samuels.



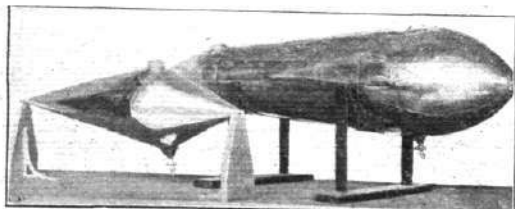
Sketches showing examples of wing construction by T. W. K. Clarke and Co. The spars are made of silver spruce, and are built up in halves.



A "stream-line form" petrol tank constructed by the Phoenix Radial Rotary Motor Co.



An interesting petrol tank, manufactured by the Aerial Manufacturing Co. of Great Britain and Ireland, Ltd. It is made in the shape of a plane, having a dipping edge, and is intended to lift its own weight.

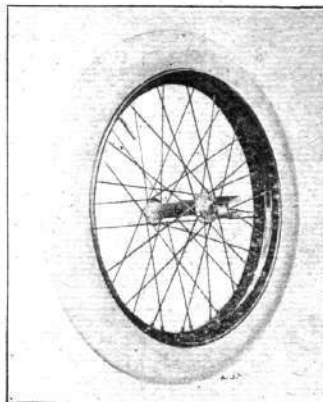


The above tanks, constructed by the Spiral Tube and Components Co., are designed with a stream line contour to give least resistance while passing through the air. The larger tank is divided into two compartments for petrol and lubricating oil.

SPRINGS.

Elastic.—Elastic springs having the rubber strands so arranged in detachable units that the strength can be varied to suit different requirements, form a speciality with the Aeroplane Supply Co., Messrs. Handley Page, Ltd., and Messrs. Harris and Samuels (Eyquem's Patents).

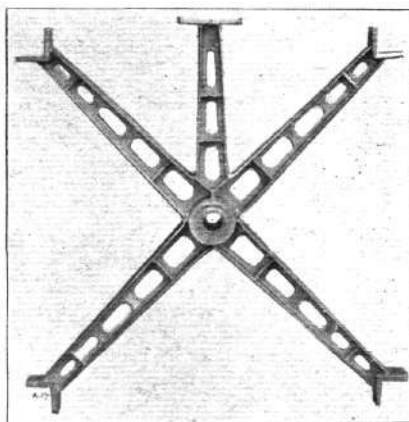
Lever.—The Lever Spring Suspension Co. have adapted their device, which has already been applied to automobiles, to the chassis of aeroplanes. The central principle of the system is the interposing of a spiral spring operated by a lever between the main spring and its hinge. The lever spring is for the purpose of absorbing minor vibrations.



A wire wheel for aeroplanes by Harris and Samuels—Eyquem's patents—which weighs 11 lbs., and is 28 ins. in diameter.

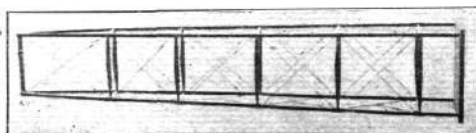
STRUTS.

Steel.—Hollow tubular steel struts are made by Rubery, Owen and Co. in any shape or section desired. One form of strut that this firm has made has a tapering oval section, and is flanged at each end. Struts of this kind are pressed in halves and oxy-acetylene welded.



A cast magnalium bracket, constructed by the Phoenix Radial Rotary Motor Co., for the support of their engines in aeroplanes.

Timber.—Hollow spars and struts made of timber are constructed of various shapes and sections by T. W. K. Clarke and Co. Struts of this kind are made in halves, and can be webbed down the centre if desired. Silver spruce is the principal wood used by this firm.



Portion of a fuselage, or lattice box-girder frame, constructed by the Motor Accessories Co., and embodying their new system of wire straining.

TANKS.

Tanks of stream line form are constructed by the Phoenix Radial Rotary Motor Co. and also by the Spiral Tube and Components Co. The Phoenix fit an adjustable safety valve to all their tanks in order to relieve excessive pressure.

A special type of stream line form tank having a section corresponding to the camber of an aeroplane is constructed by the Aerial Manufacturing Co. The aeroplane action of this tank in passing through the air is stated to be sufficient to lift the weight of the tank and part of the fuel it contains.

Welded steel tanks, having no joints or rivets whatsoever, are constructed by John Thompson and Co.

Tanks, having separate compartments for oil and fuel, are constructed by the Spiral Tube and Components Co.

TIMBER.

Woods of all kinds are supplied by W. Mallinson and Son, who hold a large stock of silver spruce for spars and struts, and also mahogany and walnut, which are frequently used in the construction of laminated propellers.

ADVISORY COMMITTEE ON AERONAUTICS.

REPLYING to a question put in the House of Commons by Mr. Fell on Monday last, Mr. Asquith said the Advisory Committee on Aeronautics was still sitting and would continue to sit next year. He referred to the interim report already issued and published in *FLIGHT*, and said that Capt. Murray Sueter, R.N., representing the Admiralty, and Mr. Mervyn O'Gorman, superintendent of the balloon factory, had been appointed additional members of the Committee. Up to the present, the total approximate cost amounted to £10,000, and experiments in aerial navigation, of a practical nature, were still being conducted at the National Physical Laboratory.

"COUNSELS OF COWARDICE" AND A CONTRAST.

It would, perhaps, be difficult more concisely to show—by contrast with the manly views of the lover of progress—the unlovely emanations of the retrogressive human mind than by the following juxtaposed letters, culled by us from the *Daily Chronicle* and from the *Glasgow Record* lately. Nothing could well confirm more fully the line which we took in last week's leader. More readers of *FLIGHT* than one will be grateful to Sir Martin Conway for his particularly straightforward and reasonable statement:—

"Development's Steady Course," Flying Machines.

SIR,—If you look back over the history of any sport or practical invention applied to popular use and involving danger, you will find that public opinion passes through the same silly round of stages.

First the public opens its mouth and gapes with wonder. Presently it says, "This is very dangerous." A little later it cries, "This new thing interferes with my habits." Finally, when some prominent person is killed, it shouts aloud, "Stop! stop! Prohibit these people. Shut them up. Make the sport illegal." Naturally no one in authority pays any attention at any stage of this fool's progress.

Development follows its steady course. Experience diminishes danger. The public learns new habits and adjusts itself to new conditions, and before long comes to believe that in some way the credit of the new accomplishment belongs to it. It was so with motor cars. It will be so with flying machines. Brave men sacrifice their lives to win new powers which unworthy humanity in the mass presently inherits. All honour to the brave—but none to humanity! Maidstone. MARTIN CONWAY.

I don't know what Members of Parliament are doing that they don't pass a Bill to stop people from risking their lives in these life-destroyers. It's terrible when you read of the number of people killed in the short space of two years.

God gave the earth for mankind and the air for the birds. Can these people who fly not put their money to better use? I see they are stopping the Johnson and Jeffries moving pictures. But it is twenty times worse than even a real prize fight to see a man being killed before your eyes.

Glasgow. A WISE MAN.

Aviation Dabblers.

Alas! aviation is in the money-grabbers' hands. With few exceptions flying men are risking their necks for money, not for the further progress or development of science. "Praise where praise is due." There are exceptions, but the greater majority of flying men are merely buying machines and risking their lives for money.

A. FOX.

TOOLS.

Tools of every description, whether for wood or metal working, are supplied by R. Melhuish, Ltd.

TYRES.

Tyres suitable for the wheels of aeroplanes are supplied by the Aeroplane Supply Co. and the North British Rubber Co.

WHEELS.

A very light and strong type of wheel for aeroplanes is being put upon the market by Harris and Samuels (Eyquem's Patents). These wheels are made in several sizes, from 14 ins. in diameter upwards. One of the larger sizes, shown in the illustration, is 28 ins. in diameter, and weighs 11 lbs.

WIRE.

Steel wire of various qualities and gauges can be obtained from Brown Bros., Melhuish, Ltd., the Motor Accessories Co., Rubery, Owen, and Co., and Handley Page, Ltd. Silver and nickel-plated wire can be obtained from the latter firm.

DEVELOPMENTS WITH THE DUNNE MACHINE.

PROGRESS continues to be made by Mr. J. W. Dunne with his biplane at Eastchurch, and recently a series of short flights in winds of gradually increasing strength have been made. The automatic stability of the machine is still maintained, and no alterations have had to be made in the trim of the machine.

The machine turns well on the dual flap control, the relative proportion of banking to turn seems correct, and neither in wide nor sharp turns is there any centrifugal or centripetal action. Capt. A. D. Carden, who designed the propellers, and Mr. D. W. Barton, are learning to fly the machine.

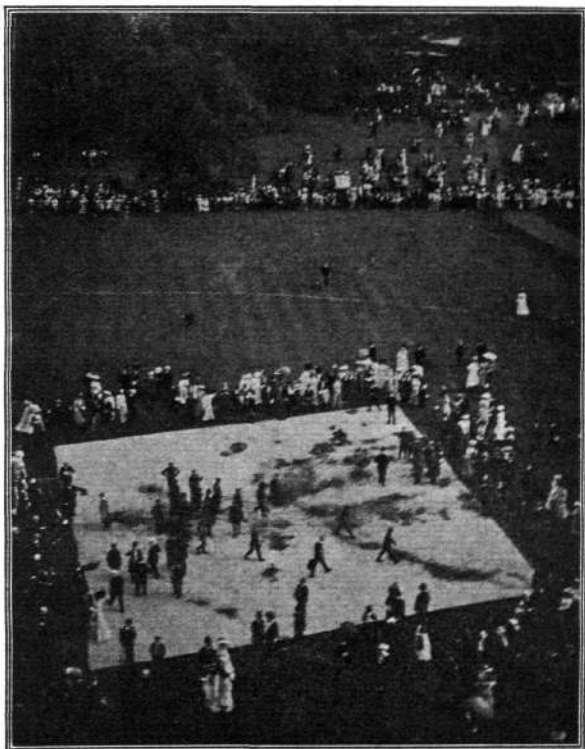


Photo by Dr. W. J. S. Lockyer.

Hurlingham Grounds, as seen from "Le Nephys" balloon, May 30th, 1908. Note the starting mat from which the balloon has just been despatched.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Lanark International Aviation Meeting, August 6th-13th, 1910.

The attention of members is drawn to the following facilities which will be granted to them at the Lanark International Aviation Meeting which takes place from the 6th to the 13th August:—

Motor Enclosure.—A portion of the Motor Enclosure has been reserved for the cars of members of the Royal Aero Club, the charge for car and driver being 5s. per day or 21s. for the whole period.

Enclosure.—Members of the Royal Aero Club will be admitted to the Special Enclosure, with unreserved seat in the Grand Stand, on payment of 2s. 6d. per day, or 15s. for the whole period, or with booked seat 5s. per day, or 21s. for the whole period.

Members must produce their membership cards when entering both the Motor and Special Enclosures.

Members will also be admitted to the "Club" Enclosure on production of their membership cards.

Hotels.—No special arrangements have been made as regards hotel accommodation. There are only two hotels in Lanark, and both have been booked up. The Peebles Hydro is within 25 miles of the course, and good hotels are to be found at Glasgow and Edinburgh, from which cities special trains will run daily.

Flying Course.—The flying course is within one mile of the town of Lanark, and is almost equi-distant from Glasgow and Edinburgh. It is connected by rail with the Upper Ward of Lanarkshire and the Ayrshire coast, and is only a few miles by rail from Carstairs, which is on the Caledonian and London and North-Western line from the south, and at which station the bulk of the express trains from London stop.

The Caledonian Railway Company has constructed a special station within 300 yards of the course.

The following is the provisional programme of events:—

Saturday, August 6th.—Speed, altitude, slowest circuit, delivery of despatches.

Monday, August 8th.—Speed, altitude, longest distance, cross-country.

Tuesday, August 9th.—Speed, altitude, weight carrying, longest distance, starting.

Wednesday, August 10th.—Speed, altitude, slowest circuit, cross-country.

Thursday, August 11th.—Speed, altitude, weight carrying, longest distance, starting.

Friday, August 12th.—Speed, altitude, slowest circuit, cross-country, delivery of despatches.

Saturday, August 13th.—Speed, altitude, slowest circuit, longest distance, cross-country.

The gates will be opened at 11 o'clock daily. The Meeting will commence at 12 noon, and cease at sunset each day.

Committee Meeting.

A meeting of the Committee was held on Tuesday, the 26th inst., when there were present:—Mr. Roger W. Wallace, K.C., in the chair, Mr. Ernest C. Bucknall, Col. J. E. Capper, C.B., R.E., Mr. John Dunville, Prof. A. K. Huntington, Mr. J. T. C. Moore-Brabazon, Mr. Stanley Spooner, and Harold E. Perrin, secretary.

New Members.—The following new members were elected:—George Douglas Begg, Sir Frederick Ricketts, Bt. Mrs. Shenley.

Blackpool Aviation Meeting.—*Entries.*—The following entries for the Blackpool Aviation Meeting were approved:—

Cattaneo.	Grace.	McArdle.
Chavez.	Grahame-White.	Radley.
Drexel.	Jones.	Roe.

Timekeepers.—C. P. Glazebrook and A. G. Reynolds were appointed Timekeepers.

Lanark International Aviation Meeting.—*Entries.*—The following entries for the Lanark International Aviation Meeting were approved:—

Audemars.	Cody.	Gilmour.	Morelle.
Blondeau.	Colmore.	Grace.	Ogilvie.
Cattaneo.	Dickson.	Hanriot.	Radley.
Champel.	Drexel.	Harding.	Tetard.
Chavez.	Gibbs.	Kuller.	Vidart.
Cockburn.			

Stewards.—The following Stewards were appointed:—

John Adam.	Prof. Biles.	Maj. Lindsay Lloyd.
Prof. Barr.	V. Ker-Seymer.	

Aviator's Certificates.—The following Certificates were granted:—

17. Capt. G. W. Dawes.	18. A. V. Roe.
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The Late Hon. C. S. Rolls.—A Sub-Committee comprising Mr. John Dunville, Prof. A. K. Huntington and the Chairman (R. W. Wallace, K.C.) was appointed to consider what form the proposed memorial to the late Hon. C. S. Rolls should take.

Committee Meetings.—Owing to the holidays and the Lanark Meeting, no meeting of the Committee will take place until Tuesday, August 16th.

Passenger Flights at Blackpool and Lanark.

Mr. J. Armstrong Drexel, member of the Royal Aero Club, who will be competing at Blackpool and Lanark, has kindly consented to take up passengers at a small fee, and the whole of the proceeds will be handed over to the Middlesex Hospital Fund, which is being raised by H.S.H. Prince Francis of Teck, honorary member of the Royal Aero Club.

Balloon Trip to Boulogne.

Owing to the high wind prevailing on Saturday last, the Balloon Race at Hurlingham was abandoned. Mr. John Dunville, however, finding the wind favourable for a cross-Channel trip, ascended at 4 p.m., and landed at Boulogne about 8.30 p.m. He was accompanied by Mrs. Dunville, Lady Milbanke and Mr. C. F. Pollock. On arriving at Boulogne, the party was received by M. Crespel, President, and M. Comte, Vice-President, of the Boulogne Aero Club, who showed them every hospitality and rendered valuable assistance in passing the balloon through the Customs.

Library and Pictures.

M. Robert Esnault-Pelterie has presented to the Club an official report of the First International Exhibition held in Paris, October, 1909.

Mr. C. G. Grey, of the *Aero*, has kindly presented a picture dealing with Mr. Grahame-White's attempt for the London to Manchester flight.

HAROLD E. PERRIN,
Secretary.

166, Piccadilly.

PROGRESS OF FLIGHT ABOUT THE COUNTRY.

(NOTE.—Addresses, temporary or permanent, follow in each case the names of the clubs, where communications of our readers can be addressed direct to the Secretary. We would ask Club Secretaries in future to see that the notes regarding their Clubs reach the Editor of FLIGHT, 44, St. Martin's Lane, London, W.C., by first post Tuesday at latest.)

Aerial League (CARLTON HOUSE, REGENT STREET, S.W.).

At the annual meeting of the League, held at the Carlton Hotel on the 21st inst., Capt. Cave-Brown-Cave made a sympathetic reference to the death of the Hon. C. S. Rolls. He said no better memorial could be devised than a school for the instruction of students both in the theory and practice of aviation. Mr. J. H. Ledebour then outlined a scheme for the establishment of such a school, close to London. It was estimated that the cost, including two aeroplanes, the necessary sheds and workshops and

their equipment, and the running expenses for the first year, would amount to £2,500.

Aero Models Association (CANTON HOUSE, WESTMINSTER).

A SERIES of competitions have been arranged to take place at the Crystal Palace on August 13th, entries closing next Saturday (August 6th). There are five classes, for machines of 1, 2, 4 and 8 sq. ft., and unlimited surface, and the entry fees range from 2s. 6d. to 12s. 6d. There will be three prizes in each class, viz., in the 1st Class, £3, £1 10s. and £1; Class 2, £4, £2, £1 5s.;

Class 3, £5, £2 10s.; £1 10s.; Class 4, £6, £3, £1 15s.; and Class 5, £7, £3 10s. and £2. There will also be a competition for Boy Scouts, for which no entrance fee is charged, and a contest for youths under 17. For this the fee is only 6d. Full particulars can be obtained from Caxton House, Westminster, S.W.

Arundel House School Ae.C. (15, ARLINGTON ROAD, SURBITON).

THE second annual model aeroplane contest was held at Ham Common, Kingston-on-Thames, on Saturday, the 23rd inst., in the presence of a large number of appreciative spectators. The announcement was originally made for Wimbledon Common, but permission was refused at the last moment on account of the "danger involved to the general public"! The same short-sighted policy has already closed Cooper's Hill, Claygate, to the club, as well as the three Royal parks, Hampton Court, Bushey and Richmond, and considerable difficulty is now experienced in obtaining a flying ground at all. Mr. Wilfrid L. Evershed acted as judge, and the tests imposed were as follows:—(a) Speed over a measured course of 100 ft.; (b) The longest time in the air without touching ground; (c) longitudinal and lateral stability; (d) steering to right and left; (e) the longest flight in point of distance. In the competition for seniors the first prize was won by R. F. Mann (Mann monoplane 18) 22 points, closely followed by C. Griffiths (Ridleyplane 31) 21 points. In the junior competition G. Kettle (Mann monoplane 17) secured the first prize, and N. Whitechurch (Ridleyplane 24) the second. The silver medal for longest flight fell to C. Griffiths (Ridleyplane 31), who made an absolutely straight flight of 602 ft., thus establishing a club record. In the last twelve months five of the members of the club have secured between them nearly a dozen prizes in external competitions.

Birmingham Aero Club (165, HAMPTON STREET).

THE Birmingham Aero Club's competition at Uffculme, on July 23rd, was carried out in half a gale of wind, and some of the models were badly damaged. The results were: Mr. T. Haynes, 1st prize, 30s.; Mr. A. W. Close, 2nd prize, 10s.; Mr. G. Mason, 3rd prize, 5s. Mr. E. Noble, prize of 15s. for second and third longest time in the air.

The club has a competition at Sparkhill on August 2nd, when prizes amounting to £6, and two medals will be put up. First prize in open event, £2. A novelty will be a flight of models carrying little acetylene lights.

Kite and Model Aeroplane Assoc. (27, VICTORY RD., WIMBLEDON)

ON Wednesday, July 20th, the Association held three competitions at the Aerial Garden Rendezvous, Crystal Palace. The field was a very good one, 19 having entered for the steering competition, 15 for best all-round model, and 11 for the youths' competition. The day was not an ideal one for models, the gusty and changeable winds putting them to a severe test.

The Judges were Messrs. H. E. Hughes, R. P. Grimmer, W. H. Akehurst and Mr. Harry Turrill, who made the following awards:—

Steering Competition.—Prizes, Aerial League Medals, 1st silver, 2nd and 3rd bronze.

- | | |
|-----------------------------------|-----------|
| 1. G. P. Bragg Smith (biplane)... | 180 marks |
| 2. W. Rowland Ding (monoplane)... | 164 " |
| 3. W. H. Sayers (biplane)... | 137 " |

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FRENCH TRADE SOCIETIES FORMALLY AMALGAMATED.

AT an extraordinary general meeting, held on the 22nd inst., of the *Chambre Syndicale des Industries Aeronautiques*, founded some time ago by the Marquis de Dion, the formalities necessary for joining forces with the Association des Industries de la Locomotion Aérienne, the more powerful body of which M. Esnault-Pelterie is the head, were carried through. The new body takes the name of *Chambre Syndicale des Industries Aeronautiques*, and the following officers have been elected, including, as we have already announced, M. R. Esnault-Pelterie as President:—

Honorary Presidents.—Marquis de Dion, MM. Louis Godard, A. Clement and A. Darracq.

President.—M. Robert Esnault-Pelterie.

Vice-Presidents.—MM. L. Blériot, G. Juchmes and André Shclcher.

Secretary.—M. André Granet.

Keeper of Records.—M. Lucien Chauvière.

Treasurer.—M. Maurice Echale.

Members of Committee (in addition to all those named above).—MM. G. Besancon, E. Carton, G. Collot, Pierre Delaunay-Belleville, G. Forest, Paul Guittel, Count Hy. de la Valette, Count H. de la Vaux, Levassieur, Maurice Mallet, Menin, Paul Regnard, Thonel Vinot, Charles Voisin and Charles Weismann.

- | | |
|---------------------------------------|-----------|
| 4. R. F. Mann (monoplane)... | 133 marks |
| 5. C. Fleming Williams (monoplane)... | 112 " |
| 6. F. H. Harris (monoplane)... | 90 " |

Best All-Round Model Competition.—Prizes, Aerial League Medals, 1st silver with gold centre, 2nd silver, 3rd bronze.

- | | |
|------------------------------------|-----------|
| 1. G. P. Bragg Smith (biplane)... | 152 marks |
| 2. Fleming Williams (monoplane)... | 132 " |
| 3. S. Langridge (monoplane)... | 112 " |
| 4. W. Rowland Ding (monoplane)... | 76 " |

Youths' Competition for Models made by Competitors.—Prizes, Aerial League Medals, 1st silver, 2nd and 3rd bronze.

- | | |
|------------------------------------|-----------|
| 1. C. Ridley (Ridleyplane 30)... | 100 marks |
| 2. C. Tester (biplane)... | 97 " |
| 3. G. Clarke Rogers (monoplane)... | 89 " |
| 4. R. F. Mann (monoplane)... | 66 " |

The prizes which have been won during the summer session will be presented after the competition on July 27th.

Olton and District Model Aeroplane Club.

READERS of FLIGHT residing in this district and interested in model making are requested to communicate with V. L. Thompson, "St. Elmo," St. Bernard's Road, Olton, nr. Birmingham, who is forming a club.

Sheffield & District Ae.C. (22, MOUNT PLEASANT RD., SHARROW)

A MODEL flying meeting was held at Shirebrook, near Mansfield, under the auspices of the Sheffield Aero Club, on Saturday, July 23rd. The weather was very rough, as may be judged from the fact that one side of the tent, where models were got ready, was torn down by the strong wind. Notwithstanding this, some excellent flying was seen and greatly appreciated by the 3,000 spectators present.

Results.—Class 1, amateurs only. 1st, G. Askew (monoplane), 415 ft.; 2nd, C. W. Cotterell (monoplane), 254 ft.; 3rd, not yet awarded owing to dispute. Qualified, W. S. Knowles (biplane), 232 ft.; — Simms (monoplane) 225 ft.

Class 2, amateurs v. professionals. 1st, W. S. Knowles ("Finbat" monoplane), 310 ft.; 2nd, E. Richardson ("Finbat" monoplane), 275 ft.; 3rd, — Ruggs ("Curvoplane" monoplane), 266 ft.

Construction Prize, amateurs only.—Divided between Simms (monoplane), Lovell (monoplane). Mr. C. Wightman, Secretary of the Sheffield Club, officiated as judge.

Some most remarkable flying was witnessed after the competitions were over, and the high wind had died down somewhat.

Mr. Fulwood of Shirebrook flew a small Twining model with great success. Longest flight, 880 ft. Mr. Briggs of Belper also accomplished a distance of approximately 800 ft. with his Curvoplane model. Other models, including Mr. Richardson's "Finbat," flew splendidly under the improved conditions. A highly successful meeting was then brought to a close after just over one and a half hours flying.

The secretary will be pleased to hear from local fête committees with a view to arranging model flying entertainments.

MORE PILOT AVIATORS.

THE number of aviators who have satisfactorily passed the tests of the Aero Club de France now stands at one hundred and fifty with the sixteen just issued. In the last official list, by an error, the names of three pilots, De Petrowski, Doroginski and Loraine were omitted. These certificates were numbered 124, 125 and 126, and we therefore reprint the correct list, starting from number 124. The list includes Mr. Robert Loraine ("Jones"), Chateau, a new Tellier pilot, "Pierre-Marie" a new R.E.P. pilot, and General Bonnier.

- | | |
|-----------------------------------|---------------------------------------|
| 124. De Petrowski (Sommer) | 139. Eugène Renaux (M. Farman) |
| 125. Doroginski (Antoinette) | 140. Gaston Cugnet (Blériot) |
| 126. Jones Loraine (H. Farman) | 141. Pierre-Marie Boruniqué (R.E.P.) |
| 127. Ruchonnet (Antoinette) | 142. Lieut. Lethoux (H. Farman) |
| 128. Maurice Tabuteau (M. Farman) | 143. Lieut. Remy (H. Farman) |
| 129. Adrien Verliac (Antoinette) | 144. Jean Mauvais (Sommer) |
| 130. Van Maasdyck (Antoinette) | 145. Lieut. Basset (H. Farman) |
| 131. Lieut. Maillols (Wright) | 146. Lieut. Maillefer (H. Farman) |
| 132. Lieut. Chevreau (Wright) | 147. Roland Garros (Demoiselle C.-B.) |
| 133. René Vidart (Hanriot) | 148. Emile Obre (Obre) |
| 134. Paul de Lesseps (Sommer) | 149. Léon Versepu (Demoiselle C.-B.) |
| 135. Chateau (Tellier) | 150. Edouard Beaud (H. Farman) |
| 136. Louis Kuhling (Blériot) | |
| 137. General Bonnier (H. Farman) | |
| 138. Lieut. Gronier (H. Farman) | |

BRITISH NOTES OF THE WEEK.

Flying Over the British Fleet.

A VERY impressive flight was carried out by Mr. Claude Grahame-White on Saturday evening, when he flew over the Home, Atlantic and Mediterranean Fleets assembled in Mounts Bay, Cornwall. There were about 130 vessels altogether, and at dusk, when they were all lit up, Mr. Grahame-White started from Penzance, and after flying along the shore, bore out and circled over the Admiralty yacht "Enchantress," and then over the "Dreadnought." He then sped away to Penzance Harbour in order to get his bearings and afterwards made a safe descent. Subsequently he claimed that he could easily have dropped missiles on to the warships, and he hopes with permission to experiment in this direction.

As the vessels left Torbay on Wednesday afternoon Mr. Grahame-White flew over them.

Grahame-White at the Crystal Palace.

MR. GRAHAME-WHITE paid a short visit to the Crystal Palace on Tuesday of last week, and made two flights. He started for the first about 7 p.m. and first circled over South Norwood, and then back over the Palace itself. His second trip, made after a brief interval, followed practically the same direction.

Entries for Lanark and Blackpool.

THE entries received for these two meetings will be found on page 600, among the official notices of the Royal Aero Club. They number twenty-one for the Lanark Meeting, which commences on August 6th, and nine for the Blackpool Meeting, which opened on Thursday last.

Programme for Blackpool Meeting.

THE programme for the Blackpool meeting follows somewhat on the lines suggested in these pages last week, in that instead of a few big prizes being offered, four prizes will be won outright each day, and a special prize of £200 will be awarded at the conclusion of the meeting. Each day there will be a prize of £100 for the most meritorious performance, another prize of £100 for the longest distance flown, with a second prize of £50 for the second best total, and a prize of £50 for the greatest altitude. Three hundred pounds a day for six days makes £1,800 and that plus the special prize for £200 for the best performance during the

meeting reaches the limit allowed for prize money at a national meeting.

A. V. Roe at Brooklands.

ON the occasion of the motor cycle race meeting at Brooklands on Wednesday of last week, Mr. A. V. Roe was out on his triplane and made some good trips, including one of 6 mins. duration. Subsequently he made several passenger flights. He has been putting in good work whenever the weather has been favourable, and has passed the necessary tests for the R.Ae.C. pilot certificate.

A Map for Airmen.

HAVING the approval of the Royal Aero Club a map of England, especially intended for those who travel by air, is now being prepared, and the first sheets will be issued shortly. By a special process the map will be so made that the prominent details will have the appearance of being in relief. Hills, woods, dangerous wind-zones, prominent landmarks, and favourable landing places will be indicated upon the map, which will be to the airman what a chart is to the sailor. Truly a splendid public work to have been accomplished by private enterprise.

Mr. Harding a "Pilote-Aviateur."

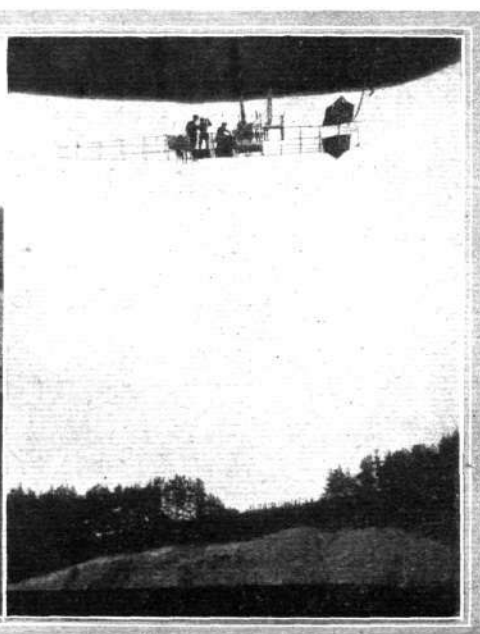
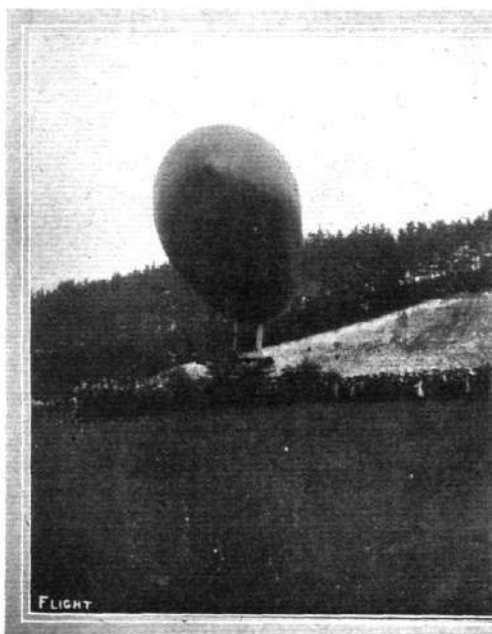
ON the 19th inst. Mr. Harding, who has been making some good flights at Amberley, on his J.A.P. monoplane, successfully made two of the flights necessary to obtain his pilot's certificate, and later in the week he completed the tests. Moulthier, who has been practising at the same place with a Biériot monoplane, has also passed the Ae.C.F. examination.

Rev. Sidney Swann Abandons Flying.

AFTER experimenting for twelve months with a monoplane of his own design, the Rev. Sidney Swann is said to have decided to give up the subject. His greatest success was a series of long hops of about 30 yards, and this was ended by charging into a grazing sheep with dire results to the latter.

An Aviator Fined for Damage.

FOR having caused damage to a grass field, George Hammond was fined 2d. and costs at Consett on Tuesday. The defendant said he was flying a small aeroplane, and after a short distance in the air it dropped in the field, and the police caught him.



Photos by Lady Susan Sutton.

The British Army airship "Beta," after its night in its temporary chalk-pit harbour at Bury Hill, manoeuvring for a start on her home voyage; and well away for Aldershot.

FOREIGN AVIATION NEWS.

Brussels Meeting.

BAD weather marred the opening days of the international meeting at Brussels, which commenced on Saturday last. During the first two days only three flyers ventured out, while on Monday the wind blew steadily all day, so that no flight whatever was officially recorded. On the Saturday, Lauser was the first out, and in the course of a 10-minute flight on his Henry Farman machine he rose to a height of 425 metres, while Oleslaegers on his Blériot flew for 8½ mins. and went up to 375 metres. Except for another short but high flight by Lauser this closed the flying for the day. On Sunday these same two were out, and they were joined by M. Kinet, who, on his Henry Farman machine, was up for 27 mins. 55½ secs. altogether. Oleslaegers rose to a height of 1,776 metres, and was also flying for 26 mins. 28 secs., but Lauser only made a short trip, a little over 3 mins. duration.

Marseilles Meeting.

DURING the closing days of this meeting the weather showed practically no improvement over that of the first three, the doings on which were recorded in our last issue. As a consequence, there were no very extended flights, and on Saturday there was no flying of any sort. The best work was on Thursday, when Fischer, in the course of a trip lasting half an hour, flew over the sea and above the town and harbour. Cheuret too made a similar flight, while Aubran, on his Blériot, ventured over the sea for a little way. Madame Herveu made two trials in a straight line, and one circuit of the course. On the other days the flying was restricted to short trips, mainly of one round of the course by Vallon on his Sommer, Fischer and Cheuret on Henry Farman machines. On the 10th Capt. Madiot made some experiments with man lifting kites. He remained suspended in the air for half-an-hour, while his assistant Truchot was up for 1 hr. 45 mins.

Ae.C.F. Defends its Title.

IN view of the fact that several new societies have recently been founded in France, and taken unto themselves titles which are colourable imitations of the national body, the Aero Club de France have recently been taking steps to assert their rights. Several of the offending clubs have offered to amend their titles, but others show some obstinacy, and legal action is to be taken against them.

French Tests for Aerial Motors.

THE Ligue Nationale have announced that they intend offering a sum of 20,000 francs in connection with a competition for aviation motors to be held during the early part of next year. The basis of the award will be weight per horse-power, and the power developed by the motor will be absorbed by an aerial screw.

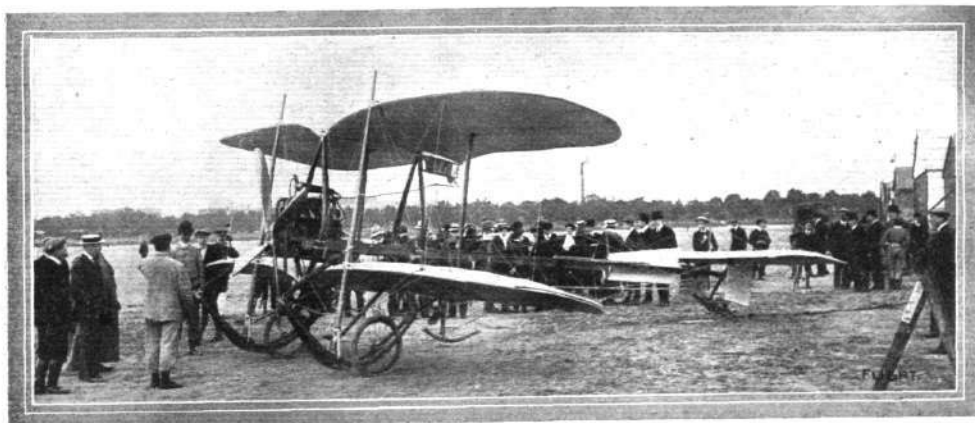
Doings at Mourmelon.

AT the Voisin School, on Sunday last, Bregi, on his new racing Voisin biplane, was flying for two hours at a very good height over the towns and villages, whilst Bievolucie was up for 1 hr. 10 mins., passing during his trip over Mourmelon and Cuperly.



Svendsen, the Swedish aviator, who, on his Voisin, flew across the Sound recently, starting from Copenhagen (Denmark) at 4.3 p.m., reached Sweden (Malmö) at 4.34 p.m., a distance of 28 kiloms. as the crow flies.

Later he carried a passenger for 10 mins. He made two trials of 20 and 40 mins. on the previous day, while on Friday Bregi made a flight of an hour. On Saturday, although there was a strong wind blowing, Laffont tried a couple of new Antoinette machines,



The latest Odier-Vendome monoplane which is to be used by Rougier. It is fitted with a 60-h.p. 8-cyl. E.N.V. engine.

and on one was out for half an hour. On the 20th inst. there was a good deal of activity. Morlat made a trip of half an hour's duration on his Voisin, while Lafont, the Antoinette instructor, was busy for 3½ hours giving lessons in rapid succession to sixteen pupils. Mme. Frank was trying her new Henry Farman machine, and after a satisfactory trip of 20 minutes' duration, had it dismantled and sent to Calais for her proposed cross-Channel flight.

Chateau on the Tellier.

At the Tellier flying ground at Draveil, Chateau has been making several good flights on his Tellier monoplane and has obtained his pilote-aviateur's certificate. He was up for half-an-hour on the 19th inst.

French Military Wright Flyers.

THE French military aviators now include five pilots among their ranks, the last two to obtain the Ae.C.F. certificate being Engineer Lieutenants Lucca and Saulnier, who have been learning at Villacoublay under Count Lambert.

New Hanriot Pupils.

SOME of the latest owners of Hanriot monoplanes are showing remarkable aptitude in learning to fly them. Chassagne, at Rheims, on Friday of last week, at his second lesson, continued for 20 minutes, and on the following day he was out for half an hour. Martin and Loie Moser have also been making very good progress.

De Baeder Flies from Lille to Douai.

A FINE performance was made by De Baeder on Tuesday of last week, when, mounting his Henry Farman machine, he rose from the flying ground close by Lille, and steering for Douai, landed there 25 mins. later, having covered the 30 kiloms. at a speed of about 70 kiloms. an hour.

Dubonnet's Absence from Rheims.

SOME of our readers have noticed with surprise the absence of the Tellier monoplane from the Rheims meeting. As a matter of fact, this was due to the unfortunate death of the father of M. Dubonnet, who was, in consequence, called home from Rheims on the eve of the meeting. It had been hoped that he would have flown one of the new racing monoplanes, which has a 50-h.p. engine and is of much smaller dimensions than the standard 35-h.p. machine.



Walter Brookins, the holder of the world's altitude record of 6,175 ft., which he accomplished on a Wright flyer, July 9th, at Atlantic City, N.J., as recorded.

On a recent trial it attained a speed of 90 kiloms. an hour, and it is very regrettable that it was not seen in competition with the other racing monoplanes.

Aeroplane Struck by Lightning.

AFTER Ehrmann had been flying for about 35 minutes last week over the country round the flying-school at Pardenone, a storm suddenly burst over the place. While the aviator was endeavouring to effect a landing his machine was struck by lightning, and burst into flames. It fell with a drop to earth, but marvellous to relate the aviator escaped uninjured.

Madame de la Roche Convalescent.

UNDAUNTED by the serious accident which befell her at Rheims, Madame de la Roche is now convalescent, and only anxious to be at the wheel of an aeroplane again. She has suffered no disfigurement, and her various injuries are going on very satisfactorily.

Flying Through the Simplon Pass.

THE prize of £4,000 offered in connection with the Milan meeting, for a race from Brigue to Milan through the Simplon Pass, will be divided into three prizes of £2,800, £800, and £400. The distance is 150 kiloms., and from Brigue the competitors will follow the Saltine Valley through the Simplon Pass, and then along the Divenia Valley to Domodossola. From there the Toce Valley will be followed to Fondo Toce, then across the Lake Majeus to Laveno, from which point the course is practically straight to Milan.

An Aerodrome at Liege.

As a result of the demonstration flights which have recently been given at Ans, about 3 kiloms. from Liege, a group of sportsmen of the latter town have decided to acquire the ground and lay it out as a permanent aerodrome.

Italian Pilot-Aviators.

THERE would appear to be some mistake with regard to the granting of an Italian pilot-aviator's certificate to Pascal Bianchi, as the Italian Aviation Society announce that they have only issued five certificates as follows:—1. Lieut. Calderara (Wright); 2. Bartolomeo Cattaneo (Blériot); 3. Amerigo (Sommer); 4. Lieut. Savoia (Voisin); 5. R. Marina.

Flying Over Odessa.

THE Russian aviator, Outchkin, made a fine performance on the 19th inst., when, rising from the exhibition grounds at the Alexandres Park in his Farman biplane, he flew across the sea for 14 miles to Dofinovka and back.

Flying over Red Indian Camp.

ON Monday evening M. Jacques de Lesseps made a fine cross-country flight from the Ile de Gros Boise to Canghrawaga, where he circled above the reservation of the Iroquois Indians, who recently made M. de Lesseps a chief of the tribe, giving him the name of Thanerahoutsowanier, or the Great Winged Chief. The distance between the two points is 20 miles, but the round trip was 45 miles in length, as a detour was made to pass over Montreal. M. Lesseps has sold his two machines, including the "Scarabee," on which he flew across the Channel, to Mr. Lauremeau, the wealthy sportsman of Montreal.

The Curtiss-Wright Match.

IT is announced from New York that Wilbur Wright has accepted the challenge to fly against Glenn Curtiss from New York to Washington for a prize of £4,000. The race is to take place in August.

Chicago-New York Flying Race.

OCTOBER 8TH has been fixed upon as the date for the aeroplane race from Chicago to New York for a prize of £5,000, offered jointly by the *New York Times* and the *Chicago Evening Post*. At least three competitors must start, and they will leave at one minute intervals. Competitors may make as many stops as they like, but they must finish within seven days. At present the entries include three Curtiss machines and two Wrights.

Practice at Johannisthal.

WIENCZERS, on his Antoinette, and Thelen, on his Henry Farman machine, have been putting in a good deal of very good flying recently at the Johannisthal flying ground near Berlin. On Tuesday the former flew about 30 kiloms. in 25 mins. at an altitude of between 80 and 90 metres, while Thelen went up to 150 metres and made four circuits of the ground.

CAN WE FLY FASTER FOR LESS POWER?

SUGGESTIONS FOR WINNING THE "DAILY MAIL" £10,000 PRIZE.

PART II.

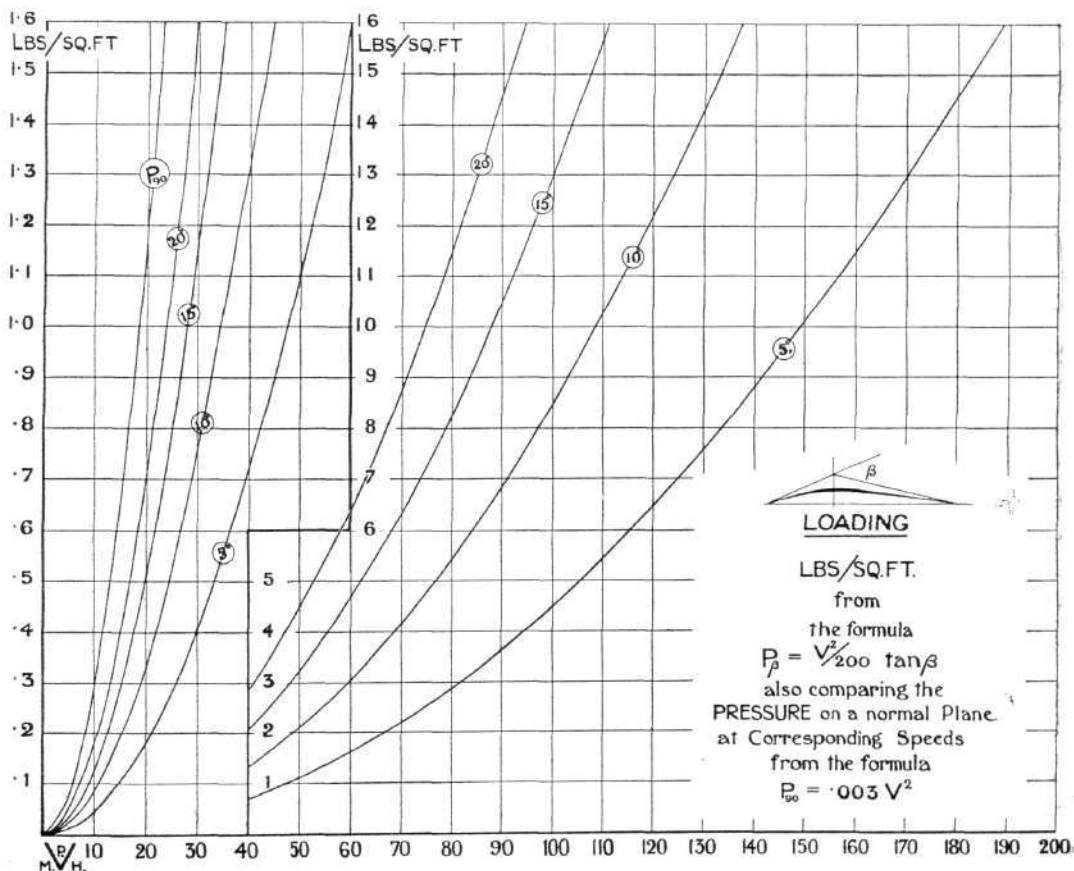
In the preceding article on this subject we advanced the theory that a cambered plane having an angle of deflection of 5° represented a condition of maximum efficiency so far as the plane alone was concerned, and we showed how, neglecting body resistance, the power that is now required to propel a plane having an angle of 20° at 35 miles an hour would be sufficient to carry the same load at 75 miles an hour if supported on a plane having an angle of deflection of 5° . We illustrated various cambered sections to show the measurement of the angle of deflection, and stated in the article that we should explain how the angle in question could be used to calculate the lift. It is, therefore, to the lift of cambered aeroplanes that the present article relates.

The accompanying charts show the results of calculations based on the angle of deflection, the data being presented in two alternative forms, either of which may be most convenient for a particular case. In one of the charts each graph represents a definite loading value, ranging from $\frac{1}{2}$ lb. per sq. ft. to 10 lbs. per sq. ft. by uniform increments. In the other chart each graph represents a certain angle of deflection, and there has also been superimposed on this chart a graph representing the pressure on a normal plane, calculated from the standard formula, $P_{90} = .003 V^2$. This graph has been included in order to illustrate the futility of deducing the lift of cambered aeroplanes from the known values of the pressure on normal planes, for it will be observed that a cambered plane having an angle of deflection of about 30° exerts as much lift as is experienced in the form of pressure by a normal plane travelling at the same speed.

In both charts we have emphasised the angle of 5° , which, as we have already pointed out, represents the conditions of minimum

resistance. Modern biplanes are loaded from 2 to $3\frac{1}{2}$ lbs. per sq. ft., the lower value being produced by an angle of 20° at about 34 miles an hour, and the higher value by the same angle at about 44 miles an hour. If it is desired to carry the same total load with a plane having an angle of 5° , the alternatives are to increase the area of the planes or to increase the velocity of flight. Already machines are very large, and the present discussion being related more particularly to a consideration of higher flight-speed we will suppose that it is desired to keep the loading value at least as high as it is at present. With a cambered section having an angle of 5° the accompanying charts show that a loading of 2 lbs. per sq. ft. will be supported at about 68 miles an hour, while the lift will become $3\frac{1}{2}$ lbs. per sq. ft. when the flight-speed is about 90 miles an hour. Still higher lifts result from higher velocities, and for the sake of example we have illustrated in one of the charts that a lift of no less than 16 lbs. per sq. ft. will result from a 5° plane travelling at about 190 miles an hour. A few motor cars have achieved a speed of 100 miles an hour, at which velocity a 5° plane would lift $4\frac{1}{2}$ lbs. per sq. ft., but if the speed could be forced up to about 120 miles an hour the lift would be as high as 7 lbs. per sq. ft.

If the total load carried is assumed to be 1,000 lbs., the supporting area required would be less than 145 sq. ft., which would be provided by a 29 ft. span monoplane having a 5 ft. chord. According to the horse-power chart published in the previous article, the power required for the propulsion of the plane alone would be about 28.5-h.p., which value ignores body resistance, supplementary surfaces, and transmission losses. It is conceivable, however, that such a speed might be approached with a good 60-h.p. engine on a machine so designed that all the extra resistance is confined to skin friction. The importance of the angle



of 5° lies in the fact that it represents the condition of least resistance, and, therefore, greatest economy of power. If the angle is reduced still further, the power required will be increased. Similarly, if the angle is larger than 5° , more power will be consumed, although in this case the area of the planes will be reduced. A plane having an angle of deflection of 10° would support 113 lbs. per sq. ft. at 125 miles an hour, in which case the total area required would only be 77 sq. ft., which would be more than provided by a monoplane having a span of 20 ft. and a chord of 4 ft.

These examples indicate with sufficient approximation the sizes and speeds that would obtain with cambered sections that to all appearances would be flat planes, and the remainder of the present article we shall devote to an explanation of how the formula for lift

$$P_\beta = \frac{V^2}{200} \tan \beta$$

has been derived.

In the first place, we have assumed that any reaction is accurately defined by the fundamental equation $P = mf$ (where P = pressure, m = the mass accelerated, and f = acceleration); it remains therefore to find an expression for the mass and another for the acceleration.

The fundamental expression for acceleration $f = \frac{v}{t}$ (where f = acceleration, v = velocity, t = time) we have written in the form $f = \frac{V \tan \beta}{l/V} = \frac{V^2 \tan \beta}{l}$ (where V = flight speed, β = angle of deflection, l = chord of plane).

It is important to note that this assumes the tangent to the leading edge of the plane to coincide with the line of flight and, therefore, ignores the dipping front edge. Insufficient practical data are available to enable an accurate value to be placed on the angle of entry, and in any case the correction when known can be made in advance by assuming some virtual value for the angle of deflection to which the present charts apply. If the angle of entry is known, the sum of the tangents for the angles of entry and trail should be substituted for the tangents of the angles of deflection. That is to

say, the virtual angle of deflection (β_1) should be derived from the formula $\tan \beta_1 = \tan \alpha + \tan \alpha_1$ (where α = angle of entry and α_1 = angle of trail).

The effect of the correction is to reduce the value of the angle, but as it is unsettled how the angle itself should be measured in the first instance, we feel justified in adopting an approximate formula for the sake of its convenience, and until science shows in what way it should be properly altered.

The mass simultaneously under acceleration is expressed by the formula $m = \frac{\rho}{g} L l = \frac{\rho}{g} A l$ (where m = mass, ρ = density of air, g = gravity, L = span, l = chord, A = area).

In the above formula it has been assumed that an *effective stratum of air equal in depth to the chord* has been deflected.

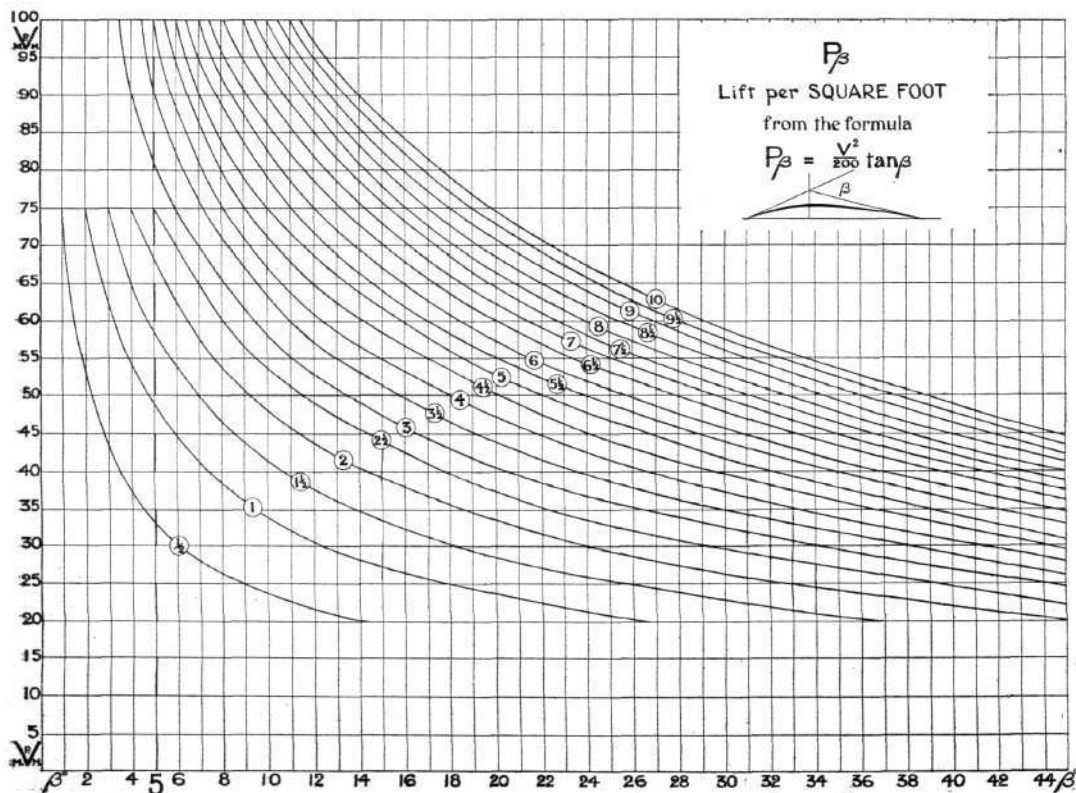
Combining these expressions in the fundamental formula, for lift

$$P_\beta = mf, \text{ we obtain } P_\beta = \frac{\rho}{g} A l \frac{V^2 \tan \beta}{l}, \text{ whence}$$

$$P_\beta \text{ (lbs./sq. ft.)} = \frac{\rho}{g} V^2 \tan \beta = \frac{V^2 \tan \beta}{200}$$

In the final form of the above expression the velocity V is expressed in miles per hour, and the constant 200 is an approximation for convenience. It is higher than the proper value, and may therefore be regarded as either modifying the value of β , or as allowing for a little altitude in flight, where the density of the air will be reduced. The expression is unaffected by attitude, because any allowance in the form $\cos \theta$ for an angle of inclination cancels out in the final formula.

In conclusion we would emphasise a point that is apt to be overlooked, viz., that the value of the charts is not affected by the assumptions in the formulae on which they are based. It is for the designer to determine what is the *effective* angle of his planes and the *effective* speed of flight. The charts show the result of combining these values. If anyone prefers to consider that a plane we have indicated as say 20° should really have been called 15° or perhaps 30° , then he would employ the corresponding graphs on the chart when estimating results.



AIRSHIP AND BALLOON NEWS.

Secrecy at Barrow.

EXTRAORDINARY care is being taken at Barrow-in-Furness to ensure that no details with regard to the big naval dirigible under construction there, shall leak out. The shed is closely guarded by Marines and only those employed on the work are allowed to enter. It is said that recently a man was found inside the barricade, and on being taken to the police-court, was sentenced to two months imprisonment, although it was not suggested that he was a spy.

"Clement Bayard II" Now Ready.

As a result of the last trial trip with the Clement Bayard airship, M. Clement has expressed himself as satisfied that all the troubles have been overcome, and that as soon as possible he will attempt the voyage to London. Before that, however, a trip will be made to the environs of Paris.

Dirigible Excursion on Lake Lucerne.

ON Sunday last the General Transaerial Company opened their airship station at Lucerne, and at noon the Astra airship "Ville de Lucerne" made her first trip over the lake, carrying several passengers, mostly Americans, who had paid £8 each for their tickets. A second short voyage was made at 6 p.m.

Another Lebaudy for Austria.

HAVING satisfactorily passed her trials, the airship which has been built by M.M. Lebaudy at their French works has been accepted by the Austrian military authorities, who have been in charge of it since Saturday last.

Inflating Balloons by Capsule.

At the park of the Aero Club of France at St. Cloud on Saturday, an interesting demonstration of the possibilities of inflating balloons and dirigibles by means of a powder, packed in capsules, was carried out. Each capsule, when ignited by a match, is said to give off 8 cubic metres of hydrogen. The apparatus required weighs about 17 cwt., but the simplicity of the process seems to indicate that, if satisfactory, it should be of considerable utility for military airships.

Cross-Channel Ballooning.

A POINT-TO-POINT balloon race for the Cup presented by Mr. Griffith Brewer had been arranged by the Royal Aero Club for Saturday last. At the time fixed for the start from Hurlingham a very violent wind was blowing, and it was decided to call the race off. About four o'clock, however, the wind dropped, and Mr. John

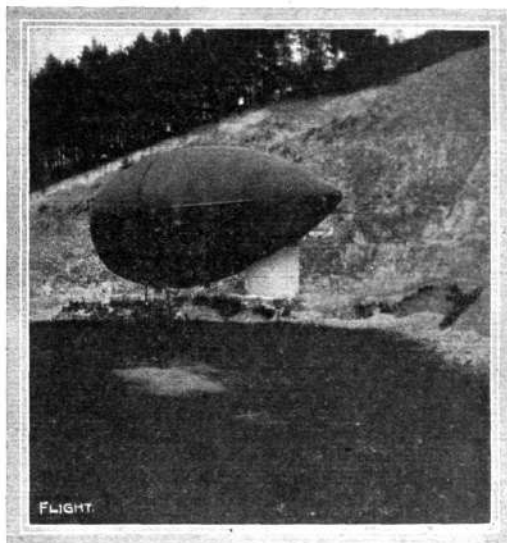


Photo by Lady Susan Sutton.

"Beta," the British Army airship, at anchor for the night in the chalk-pit at Bury Hill, as recorded last week.

Dunville, accompanied by Mrs. Dunville, Mr. C. F. Pollock and Lady Milbanke, rose in the "St. Louis" with the intention of crossing the Channel. The strong north-westerly breeze carried them along at a very rapid rate, and a safe landing was made at the Poterie Mill, by the *Grande-Armée* Column near Boulogne at 8.20 p.m., the trip of about 100 miles having occupied 4 hrs. 7 mins.

Major Sir A. Bannerman also started off with Mr. Fraser in the "Uranus," intending to land at Newhaven, but they eventually came down at Ashford, Kent, after a trip lasting two hours and a quarter.



CORRESPONDENCE.

* * The name and address of the writer (not necessarily for publication) MUST in all cases accompany letters intended for insertion, or containing queries.

Correspondents asking questions relating to articles which they have read in FLIGHT, would much facilitate our work of reference by giving the number of the letter.

NOTE.—Owing to the great mass of valuable and interesting correspondence which we receive, immediate publication is impossible, but each letter will appear practically in sequence and at the earliest possible moment.

FLYERS AND YACHTS.

[647] Might I ask for an explanation of the following through the medium of your correspondence columns. I notice that all text-books on aerodynamics place amongst the elementary rules the fact that the best lifting planes should present a length of cutting edge to the wind far in excess of its breadth. It has occurred to me that the sail of a yacht when sailing up to wind is nothing more nor less than a glider moving horizontally instead of falling vertically, yet its shape is anything but in keeping with the shape which the aeroplanist recommends, while I find it difficult to imagine that the sail of a ship could be in any way improved considering the amount of thought that must have been expended upon it. If anyone would kindly suggest the solution, or give a reference to the same in any of the publications on the subject I would be much obliged.

GEO. C. SHERRIN.

[The queries raised by our correspondent are dealt with elsewhere in an article entitled "Flyers and Yachts."—Ed.]

PROPELLER OR TRACTOR.

[648] I have had little opportunity for studying the newer literature on aeronautics except such as I have read in your valuable paper for the past twelve months or so; but the following idea has occurred to me, which, if you consider worth publishing, by all means do so; if not there is always a waste paper basket.

As the lifting effect of any plane depends on its relative velocity to the medium in which it is moving and the propulsive power of a propeller depends on the fact that it projects backwards a column of gas or liquid, which means that in the wake of a propeller the air is moving at a higher velocity relative to the aeroplane than elsewhere, why not so fit the propellers in front of the planes and gain more lifting power at a lower speed relative to earth? Little of the momentum of the backward current of the air from the propeller would be destroyed, and in any case it would seem better to fit propellers so rather than in front of engine, body, pilot, &c., which make a dead resistance and give no lifting effect.

This I see raises many points as to loss or gain of efficiency of propeller, but if you think so let others give their opinions.

A. W. P.

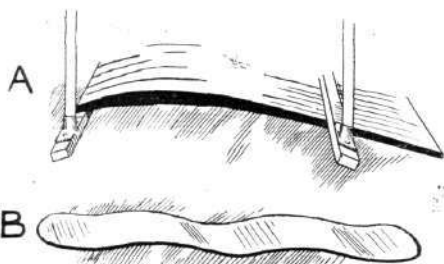
[Monoplanes for the most part have their tractor screws in front, and although it is probable that the factor determining this position is one related to constructional convenience, yet we have met some designers who have expressed a preference for the principle on the grounds mentioned in our correspondent's letter. On the other hand the wake of the aeroplane itself forms an equally important

consideration, and it is equally reasonable to argue that a propeller situated behind is in the best place.

In marine propulsion the wake (or body of water that is dragged along by the ship) is quite appreciable, and no one would think of putting a marine propeller anywhere else but at the stern where it can operate upon the wake and thus retrieve some of the lost power that the wake represents. It is on this account that it is possible to show that a boat can be propelled for theoretically less power than it can be towed. It is not altogether clear as to what is the effective value of the wake from a flying machine. Those who read our description of Sir Hiram Maxim's latest aeroplane will recollect that he considered the wake behind the principal mass represented by the pilot and engine was so great as to warrant the provision of a third propeller, mounted directly on an extension of the crank-shaft; the two main propellers of this machine being driven by ropes.—ED.]

POSITIVE AND NEGATIVE ANGLE.

[649] Re the negative and positive angle of spars (564) my aeroplane is made like Sketch A. As the sockets are bolted on the spars they are also at an angle to the stanchions at base and top, are cut at angles, and fit the sockets so that the stanchions are perpendicular. When the main spars are wired diagonally they take the proper angle for the set of the ribs, the main spars are also curved round for the wing-tip sections. This curve can only, I think, be made in ash, as I lately ordered some duplicate main-spars of spruce, and the London firm told me the spars broke, and they could not curve them for me, on the original template here; the spars also had a curve very similar to Sir Hiram Maxim's new machine. They were meant to go like Sketch B, but as the ash



did not keep this curve, well, I let them go flat again. However, I would not advise any amateur trying these curves, as they are difficult to get. The wood must be very good, and should be split off the tree, and not sawn. Probably the best way to get curved spars would be from the firms in Norway who made the sledges for the Polar expeditions, for they know how to select and curve wood. In Belfast there is not a single firm that steams wood, and if they want good hard wood it is all ordered from England ready cut to sections required. Here a local carpenter has a steam box which I used. If a steam box is not to be had, an iron pipe, plugged solid at one end, can be used for heating the wood by filling it nearly full with water and lighting a fire underneath the pipe. The wood is then put in at the open end, which is afterwards stuffed up with anything handy to keep the steam in. A boat builder on the coast curved his boat ribs in this way.

LILIAN E. BLAND.

NOTIFYING FLIGHTS IN PROGRESS.

[650] May I suggest that in future, when a flying meeting is in progress in England, some means should be afforded the public of neighbouring towns of knowing when flying is actually taking place.

In Norfolk, when the Broads are frozen, telegrams are posted up in the chief post offices, so that those who want skating can be off to the ice that very day. Some such means might be adopted.

Or an hotel, say the headquarters of the local aero club, might hoist flags, corresponding to the signal flags on the course.

In our unsettled climate, the advantage of such timely warning will be obvious.

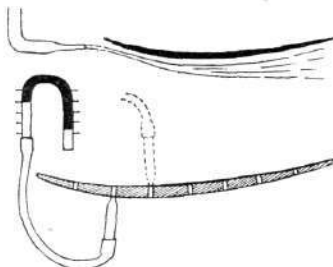
Birmingham.

M. OLLEY.

STREAM LINES.

[651] I have noticed several interesting letters lately in FLIGHT about the behaviour of the air-streams while passing over or under aeroplanes, and methods suggested for observing the streams. May I make a suggestion myself on this subject. It has often occurred

to me that the pressure-curve could be accurately measured in the following way and would be glad of your readers' opinion on the matter. It is necessary for this experiment to have access to a "wind tunnel." The aeroplane model should be carved of some substance like wood and a series of holes say $\frac{1}{4}$ -in. diam. drilled at regular intervals from front to back edge, preferably diagonally so as not to interfere with one another, then when the plane is set in the wind-tunnel at its correct angle of incidence a glass or other tube, connected by a rubber one to a U tube with scale and con-



taining coloured water, could be applied in succession to each hole, both on the top side, giving the pressures below, and on the bottom side, giving extent of rarefaction, if any, above the plane. The sketch will explain. The curves could then be plotted out, the resultant being got from combining the two. To make the air currents visible it might be possible to place in front of the place in the wind-tunnel a tube from which is issuing a jet of some visible vapour, such as ammonium chloride, at the same velocity as the air current, the jet being a long taper so as to cause no eddies of its own. Trusting this may be of some service to your readers.

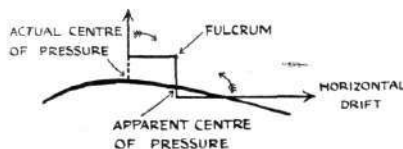
Richmond, Natal, May 21st.

V. K. VYVYAN.

CENTRE OF PRESSURE.

[652] FLIGHT for May 21st just to hand, containing Mr. Bruce-Walker's letter (515) about the dihedral angle. I should like to express my warm appreciation of this, which I consider to be the correct explanation. I was about to write myself to the same effect, only Mr. Bruce-Walker has explained the matter so much more clearly than I could have.

The week before appeared Mr. Sellers' paper on the centre of pressure on arched surfaces, a most interesting and valuable paper.



I am going, however, to draw your attention to a possible element of inaccuracy which was not mentioned in the editorial footnote. It will be noticed that pins providing a fulcrum for the planes to turn on are placed some distance above the planes.

Now the horizontal force (drift) will produce a turning moment tending to tip the front edge of surface downwards. To counteract this the fulcrum has to be placed at a sufficient distance behind the real centre of upward pressure, so that the turning moment caused by this upward pressure shall be equal and opposite to that caused by the horizontal pressure or drift. (This, of course, includes surface friction, &c., as well.)

This effect will be most noticeable at small angles of incidence, and may perhaps account for the "somewhat startling" character of the results.

Richmond, Natal, June 11th.

V. K. VYVYAN.

SUGGESTION FOR PRIZE.

[653] The very interesting and sporting prizes offered to aviators are a great incentive to inventors lacking funds, and this sportsman-like movement of the donors cannot be underestimated. The list, to my mind, requires the addition of a prize for flight, with pilot "on board," and using the *smallest engine power*, to complete the various branches of conditions. The competition could either be open up to a certain date of the season, under official observation, or upon a date stipulated by the bestower.

May I take the liberty of suggesting this for consideration.

H. H.

MODELS.

MODEL AERO CLUB FOR BLACKPOOL.

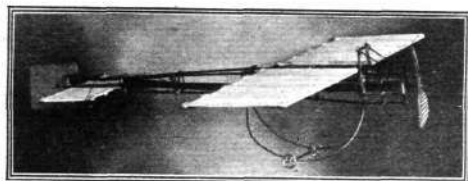
[654] Being greatly interested in aviation, and having constructed two models, I must say that there is very little encouragement for model makers in this town. I know for a fact that there are several in favour of this movement, but through lack of support many of their ideas fall through. I think if a model aero club was formed there would soon be several members. There is plenty of excellent ground for model flying. Hoping this may catch the eye of some local gentleman who will be interested in this movement, being one of the many whose pocket money is limited, I write on behalf of them.

R. RUDMAN.

CAMBERED PLANES FOR MODELS.

[655] I herewith enclose you photograph of my model monoplane. The length of the main plane is 27 ins., the width 7 ins., the tail or back plane is 12 ins. long and $3\frac{1}{2}$ ins. wide. The length of the rudder is 3 ins. and the length overall is 28 ins. The frame is triangular shaped.

I use a 6-inch Cochran corrugated propeller, driven by sixteen strands of $\frac{1}{16}$ in. elastic. The planes are covered with fabric, and the angle of the planes is made adjustable. The planes are not



cambered; on a model this size would it be any advantage if they were cambered?

The weight is $6\frac{1}{2}$ ozs. Since these photographs were taken I have fitted a wheel and skid under the tail plane.

So far the results obtained from the model have been very satisfactory. It will run along a smooth floor for a few yards and then rise into the air.

Blackpool.

R. W. MAWDSLEY.

[The planes ought to give a much better lift if they are cambered, and it would be an interesting and instructive experiment to gradually camber them until the best results are obtained. We should like to hear from our correspondent the outcome of such trials.—ED.]

MODEL CONSTRUCTION.

[656] The enclosed is a photograph of a machine which I and a partner have taken about ten weeks to complete. As this article is for "Practical Letters Column" I will not deal very fully.

First, the fuselage, which is made up of four $\frac{1}{2}$ in. \times $\frac{1}{2}$ in. poplar, 4 ins. long. The forward is 4 ins. square section for 12 ins. long,



and gradually tapers down to $2\frac{1}{2}$ ins. \times $\frac{1}{2}$ in. section. The lattice pieces are of $\frac{1}{2}$ in. \times $\frac{1}{8}$ in. birch, glued and pinned with the heads of pins about $\frac{3}{8}$ in. long, and placed V shaped on top and bottom, and vertically on the two sides.

This makes a strong and neat job. The end is finished off as shown in Fig. 1.

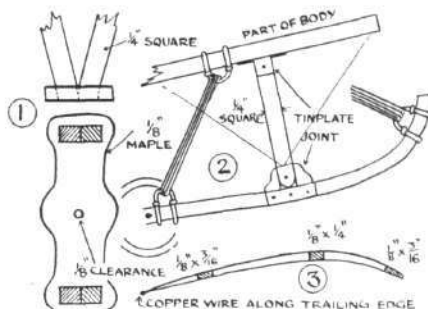
The landing chassis is, perhaps, the most interesting contrivance on the machine; the idea of it can be seen from the rough sketch (Fig. 2).

The wing is 4 ins. long over all by $7\frac{1}{2}$ ins. chord. It is correctly cambered and double-surfaced with cotton-oiled paper (see Fig. 3,

rough sketch). The wing is made detachable by lugs made of tin-plate, which fit into slots.

The tail is made up of $\frac{1}{2}$ in. \times $\frac{1}{2}$ in. birch framework, and double covered with cotton-oiled paper. This has a vertical fin and two horizontal rudders which work together by a string which is wound or unwound as required by a little hand wheel, which can be seen in the photograph about the middle of the machine.

It is driven by two 15 in. propellers (which were recommended to us by "Aerophile") through a double-grooved pulley $1\frac{1}{2}$ ins. diameter, to pulleys of $\frac{1}{2}$ in. diameter on propeller-shaft.



The motor has 24 strands of strip Para rubber, running the whole length of the machine.

I am unable to give you any lists of flights as my partner was called away to South Africa on June 22nd, and he took the machine with him to experiment with out there.

Hoping this will not take up too much room of your valuable paper.

Erith.

H. TURPIN and H. MILLER.

A BEGINNER'S MODEL.

[657] I am a constant reader of FLIGHT now, and although I have not taken in your valuable paper for long, I fully appreciate its merits.

I wonder if some other readers of FLIGHT would be kind enough to tell me what sort of models they made or first experimented with.

It is obvious that a beginner cannot start on an intricate and large model, and, being more or less a beginner, I should like some definite basis on which to start.

Doubtless many beginners, like me, feel at a loss to know where to begin, and if some reader could tell me the sort of machine to begin with, and its dimensions, I should be very grateful indeed.

Dunstable.

R. G. PINNOCK.

BELFAST MODEL MAKERS.

[658] Being a reader of your valuable paper, FLIGHT, I take the liberty of asking you to assist me in getting into touch with any other reader in Belfast who is interested in model aeroplanes. I don't know of anyone about here interested in them like myself, so I am, as the poet Gray said, "far from the madding crowd."

Marlin, N.S., Lurgan.

W. A. KIRKWOOD.

MODEL MAKERS IN CROUCH END.

[659] I should be much obliged if, through the medium of your paper, you could put me in touch with someone interested in flight models in this district. I have made many models, but am handicapped by lack of space in which to test them. I should therefore like to hear of someone with the necessary facilities, and in return would offer to help in the manufacture.

I am at present experimenting with a monoplane on rather new lines, and up to present have got very satisfactory results. It appears to me to be remarkably stable, and I fully believe that with further experiments a much improved type of machine could be made. If there is any club in neighbourhood I should be glad to hear.

17, Topsfield Parade, Crouch End.

D. J. C. LAWSON.

AUTOMATIC RUDDER FOR MODELS.

[660] I was present recently at a competition for model aeroplanes held under the auspices of the Model Aeroplane Association at Wimbledon, and was struck with the fact that the majority of models were unable to fly straight, and were noticeably weak in attempting to turn to the left.

